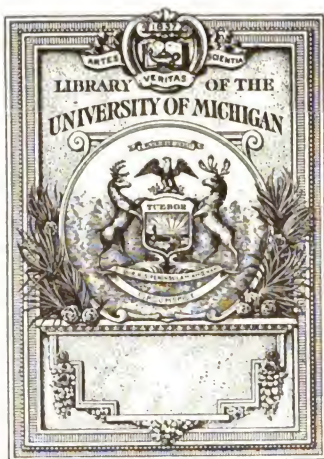


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EDITORS :

(No. 229)

FRANCIS WHITTIER PENNELL

Associate Curator

(Nos. 230-240)

HENRY ALLAN GLEASON

First Assistant



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JOURNAL

OF

The New York Botanical Garden

EDITOR

FRANCIS W. PENNELL*Associate Curator*CONTENTS

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THE PLANTING OF TREES AS WAR MEMORIALS

At the annual meeting of the Managers of the New York Botanical Garden on January 13, 1919, the following suggestions by Mr. Edward D. Adams were approved and ordered printed:

At this time, when permanent memorials to the defenders of our flag by land and sea are being considered throughout our land, and projects for community monuments of various designs are planned, we venture the suggestion that individual, as well as associated, action can effectively and economically be taken in honor of all who have served or of those who have made the supreme sacrifice, by planting memorial trees.

Such trees may properly be planted in the front yard, on the street, at the home entrance, in a park, as the decoration of an avenue, in single specimens or in groups of different species for artistic effects of form and color.

As [representing sentiments to be long cherished, such memorials would be tenderly cultivated and protected.

Their shade and fruit would yield comfort and satisfaction. Their growth would add value to the home and become an asset that succeeding generations would inherit.

Naturally, only those trees should be selected for memorials to family, school, church, and municipal honor, that will grow best in each locality and of those species that will be appreciated for their beauty, grandeur, long life, and utility.

The number of kinds of trees suitable for memorial planting is large. The widely different climates of different parts of the United States require the selection of such kinds as will grow

vigorously, and the character of the soil should also be taken into consideration; such information to those not versed in tree planting can usually be had from the nearest nurseryman or from officials of the Agricultural Experiment Station.

Those who live in homes without available grounds for planting, might contribute to the cost of a tree for its planting as part of a memorial grove in a park or garden.

The selection of the tree, the preparation of the location, and the design of the label or honor roll, may be considered and carried out in family conferences and with the participation of each member.

These preparations should be made as our men return, so that the signing of the treaty of peace may be celebrated over the nation wide by the simultaneous planting of the honor tree of each family and community that has cherished a service flag in the period of our war.

At the New York Botanical Garden, a war memorial plantation of Douglas Spruce, a characteristic American evergreen tree, will be established this spring; about one hundred trees five feet high having been secured for this purpose. For those who do not have land available and who would like to have a memorial tree planted, the offer is made to designate one of these spruces as desired on receipt of ten dollars, which will cover cost of tree, of planting, and of its care, which will be the same as that of other trees in the Garden.

ALPINE AND ROCK GARDENS

The taste for the cultivation of alpine plants is increasing, and rock gardens are becoming popular. The most successful efforts for establishing alpine gardens are made by those imbued with true scientific spirit. One must have an intense enjoyment in the study of alpines, and in administering to their wants, which latter require an accurate knowledge of their habitats, and of the best conditions for their successful growth.

To him who has traveled in the Alps and has beheld the wealth of color in the higher pastures, alpine plants make special appeal. They recall memories of the days spent in the mountains, when, for the first time he saw them in all the glory of their wild beauty.

As his alpine garden develops, there come to him day by day, memories of rocky fastnesses, bedecked with a flora whose persistence and vigor is well worthy of emulation.

As we look at them in their stone creches, we marvel that such colors, and foliage-masses, can be found in such grim surroundings. There is a charm about them that no other class of plants possesses. Other plants are equally beautiful, but they have not the setting. Our garden flowers may glow in their beauty, yet these mats of green, bedecked with bloom, appeal to us as does many another pretty living thing weaker than ourselves.

Then again alpine gardens give one a pleasing sense of intimacy with nature. Within a small area we have a little world of our own, and each species, requiring as it does our best efforts to supply its needs, gives us the greatest pleasure when it thrives under our tender care.

Within the garden's confines, we can establish hundreds of varieties of the most beautiful and interesting plants which nature with open, though often with reluctant hand, gives to us. If we are really in earnest, she assents to our removal of her treasures from their mountain homes into our imitation, though often no less acceptable, homes, among the rocks and in the cool deep crevices, which they must have to bring forth what is best in them.

Here again we can enjoy the work of increasing them, either by division, cuttings or seeds, curbing aggressive interlopers, and inducing the shy and delicate ones to come forth and blossom as the rose. We become more and more interested, and make a closer study of the plants of the alpine flora, desiring to know more of their requirements, and their place in the economy of nature.

In many rock gardens are grown bulbs, aquatics, herbaceous and other plants that do not properly belong there, and we may conclude that alpine has a wide application, when in truth it has

a very specific meaning. It applies primarily to plants of the Alps, that is, to plants of mountains, for the origin of the word Alp is Celtic, and means mountain, and thus it comes that the term is used for plants which are dwellers in high altitudes of mountains. Their greatest interest is in their adaptability to a long severe winter and a short summer, so that consequently, they develop a close dense habit of growth with small compact leaves, compact stems, and brilliant flowers. Above all, each has a thick mass of strong far-striking roots, that pierce the scanty soil between the rock crevices, and thus secure to the plant a supply of food which carries it through to fructification, or else fills the storehouses that carry it through the long trying winter. Then again because of the close mats of foliage developed, evaporation is reduced to a minimum, and, as this foliage is retained throughout the year, these alpine are really evergreen. Thus they make provision for a short summer, and a long winter. They thrust their roots far down into the crevices, where the rains and the melting snows have accumulated stores of moisture.

In their alpine homes, they have the protection of the dry snows, and do not suffer from the heavy winter rains that prevail in our climate. With us they will not receive that degree of intense light that prevails in their eyries during the brief summer, and yet our longer periods of light, compensate somewhat for alpine intensity.

Rock gardens may, and often do, contain a great variety of plants, annuals, biennials, bulbous and herbaceous forms; and even small shrubs may be introduced into the background and higher portions.

If one has glacially worn rocks, a moraine garden may well be placed at its base where the drift would naturally remain. In this mass of gravel and pebbles, one can grow with great success a variety of plants that need such cool moist situations. One need not hesitate about starting an alpine garden, for alpine, if given an opportunity, have a capacity for adapting themselves to circumstances, a capacity that has been latent in each species for many generations. As we endeavor to give to each the near-

est approach to the conditions which prevail in the habitats from which they have been removed, we are quite sure to reap that reward which modesty and exquisite beauty always brings to the earnest and ardent lover.

EDMUND BRONK SOUTHWICK.

INSECTS ATTACKING SHADE TREES

This subject has been repeatedly brought to the attention of members of the Garden, both by Dr. Seaver and myself; because these foes of trees and other plants are ever with us and eternal vigilance is necessary to keep them under control.

Insects attacking shade trees may be divided into three classes: those which devour the foliage, those which suck the juices of the leaves or bark, and those which bore into the wood. The elm leaf-beetle and caterpillars such as the fall web-worm, the tent-caterpillar, and the larvae of the tussock moth are well-known examples of the first class. Such insects defoliate shade trees, destroying their beauty and efficiency in summer and rendering them liable to injury in winter on account of the immature wood formed during renewed growth in autumn.

The aphids, the red spider, the scales, and other sucking insects are less conspicuous but no less injurious than the leaf-eaters. The aphids, for example, not only injure the leaves upon which it feeds but asphyxiates those below by covering them with honey-dew. The punctures of the red spider cause drying and decay of the surrounding tissues and also weaken the leaves and open a way for the entrance of leaf-destroying fungi.

Members of the third class are rarely seen and their presence often not even suspected until the tree attacked is dead, since their work is done inside the trunk and branches. Healthy trees do not as a rule suffer seriously from this class of insects. The most destructive borer in the vicinity of New York City is the European leopard moth, which attacks trees in vigorous health and is the cause of most of the dead branches seen upon the elm and silver maple. This insect and the leaf-beetle have so

preyed upon the elm as to render the advisability of its further use as a shade tree in this city extremely doubtful.

Trees that are regularly and seriously attacked by insects difficult to control should not be planted. There are other species, among which are some of our most popular trees, that require careful and at times expensive treatment if their vigor and beauty are to be preserved. Villages and towns not provided with spraying apparatus might well abandon these trees and use for their principal plantings species less subject to insect attack.

The tussock moth and a few other caterpillars will, unfortunately, devour almost any kind of foliage and must receive special treatment. Caterpillars that make large webs may be easily located and removed by clipping off the branch containing the web before the insects are mature. The practice of burning them out is usually attended with more or less injury to the tree.

The eggs of certain caterpillars are deposited in clusters on the twigs of trees and may be easily collected and destroyed. The tussock moth deposits its eggs on the empty cocoon from which it has emerged. These frothy egg-masses are usually conspicuous on the trunks and larger branches of trees during autumn and winter, and may either be killed in place by moistening them with creosote oil or removed with scrapers and burned. Cocoons without egg-masses probably contain parasites and should be left undisturbed. In many cities, school children have been successfully enlisted in destroying these and other egg-masses.

Shade trees are often disfigured and at times seriously damaged by various appliances and mixtures intended to prevent caterpillars from crawling up their stems. Such methods of destruction are rarely effective and their general use should be discouraged.

Leaf-eating insects are easily controlled by spraying with some poison, like lead arsenate; sucking insects must be covered with soap solution or other substance that will interfere with their breathing apparatus; while borers must be reached in their tunnels with a knife or wire, or some poisonous gas like carbon bisulfid.

W. A. MURRILL.

SOME BOOKS FROM COLOMBIA

When in Bogotá in 1917 I had opportunity to search for botanical books. While I was rewarded by few findings and perhaps none of these of much value to a professional book-hunter, still the four works discovered and brought back with me seem to have been nearly or quite unknown in this country. The first and third contain descriptions of species published as new to science, and none of these were entered in the Card-Index, our standard for the enumeration of new species of American plants.

First and most important is the "Flora de Colombia," published in Bogotá in 1897. This is by Santiago Cortés, a native Colombian whom I had the pleasure of meeting there. Prof. H. H. Rusby, who had left me in Bogotá in August, had taken with him the last copy for sale at the Librería Colombiana, the main bookstore. My copy is from Sr. Cortés himself and is now much worn, both from his own long usage and from my six months' use of it while traveling through the country. It seems strange, really almost unbelievable, that a work of such scope and so well deserving wide recognition should apparently have remained absolutely unknown to botanists in the United States until our very recent expedition.

The copy before me, of 286 pages, is marked "volumen primero," and was designed as but the beginning of a very elaborate comprehensive treatise of the flora of Colombia. But immediately after 1897 came several years of revolution, depleting the country, and scientific undertakings are so remote from economic life that they suffer severely at such times. So it is that of Cortés' flora five volumes remain unpublished. An additional advertising page, which would be number 287, informs us of the scope planned for each of the other volumes. These include a series of systematic monographs of families for their purely scientific interest, accounts of species for their medical or industrial value, a complete enumeration of species with geographic and popular information, and lastly an atlas with chromo-lithographs and engravings in black. All his life Sr. Cortés has been an enthusiastic amateur artist of plants, and at his home he showed me a

very considerable collection of the illustrations planned for this iconography.

The volume published, dedicated to one of the finest of Colombia's scholars and statesmen, Michael A. Caro, after a brief geological introduction, divides into three portions. The first part, the therapeutic flora, runs over the vegetation of the country, for the dicotyledons family by family, listing the best-known and especially the medicinal species, and making for each some entry of locality and of medicinal use. Often the latter entries are quite full, and while I am little qualified to judge, I should suppose that this is a mine of valuable observations. The monocotyledons and higher cryptogams are not so fully entered, although he has much to say of these. An industrial flora follows on pages 132 to 151, similar in treatment but much briefer. To me in my travels in remote sections of the country the most valuable portion of the book is the third, the "index" of the common names of the plants used in Colombia. This embraces pages 153 to 275, and is much more than an index. Each entry contains the scientific name of the species, and very generally notes of occurrence and uses. In a country where physicians and medicines are rare and few, the people pay that close attention to the flora which must have characterized the English in the times when our wealth of English names came into being, and so it is but natural to find almost every Colombiano well versed in plant names. To a novice, Cortés' index was indeed a key to the more important part of the flora.

Now a word as to Señor Cortés himself. In Spanish America, Colombia has been remarkable and unique in the long series of lonely or nearly lonely botanists which she has produced. It seems to be in line with the peculiar merit of Colombia's culture, in certain ways the finest, though not the greatest or at all the most broadly diffused, in the Spanish New World. First there was Mutis, the monk who came with Spanish training and afire with enthusiasm to explore the botanical unknown of New Granada's river-valleys and mountain-chains. Then there was Caldas, the patriot-martyr, a botanist as well as physicist, one of the minds of greatest scientific promise that the New World has

ever produced. He was a native Colombian, although living before the land had received that name. Next came Triana, the Colombian who has achieved most in botanical research, who worked through the middle of the nineteenth century. His scientific volumes are monumental, although it is characteristic of patronage of science there that they had to be published mostly abroad. Bogotá contains many reminiscences of him and I can scarcely refrain from repeating some. Señor Cortés follows him and appears as his rightful successor, in his enthusiastic devotion, at considerable pecuniary loss, to botany. He has given his life to the science he loves, and that in a land where he is almost without a comrade in this particular field.

Dr. Cuervo, Carlos Cuervo Marquez (following Spanish custom, the name of his mother's family follows his patronymic), has been Sr. Cortés' main appreciator in Bogotá. He is a physician of prominence. He has published for use in schools a "Tratado Elemental de Botanica" (Elementary Treatise of Botany), also printed in Bogotá, in 1913. This is divided into three parts, organography, vegetable physiology, and vegetable taxonomy. The last is the longest. While appearing to be a most helpful work, and in its country more needed than such a book as that of Cortés, for students abroad it is of much less significance.

The third Colombian botanical book I found by chance. It is the "Estudios Científicos del Doctor Andres Posada" (Scientific Writings of Dr. Andres Posada), and, to fill out in English the subtitle, "with some other writings of his on diverse themes." Truly the themes are diverse on which this professor of the University of Medellin discourses. I open on trigonometry, then physiology, then an account of his home city, Medellin, then a treatise on the serpents of Colombia, on the fish of Colombia, on the Hymenoptera, on the *Vanilla*, proposing two species as new, etc. A considerable number of short botanical papers, frequently descriptive of new species, occur scattered throughout. Equally unknown to the zoologists, as these had been to us, were the descriptions of new species of animals, ranging from insects to frogs and salamanders. Of course it is well that we should discover such volumes—this was published as long ago as 1909

—but isolated authors would do us a favor and help themselves materially as well if they would send to leading foreign institutions copies of their works. One single copy of these studies in a scientific library in this country would have put us in touch with the late Dr. Posada.

The fourth work is of least consequence botanically, and may be well-known to geographers. This is the "Estadística Natural del Estado Zulia (Venezuela)," by José I. Arocha, published at Maracaibo in 1897. The "Natural Statistics of the state of Zulia" is largely geological and topographical, but the fourth part, embracing about half the work, and of over 200 pages, is biological, and again about half of this is botanical. Economic and otherwise important plants are entered with considerable account of each, but to taxonomists the work probably has slight interest.

Still a fifth work may be mentioned. This is one seen in an old bookstore in Bogotá, but not purchased, as I then supposed our library already contained it. We have made a special study of the flora of the island of Curaçao in the Dutch West Indies, and this "Compendio de Botánica Elemental," by C. Hurtado, was published there in 1891. It is a text-book of elementary botany, of 433 pages, for the use of South American schools and lyceums. It was written in Venezuela, and that it was only later planned at all for Curaçao is shown by the fact that mention of that island is confined to an appendix treating of its flora. In footnotes a few new plant names are mentioned, though but one of these, *Iris Benitesia*, of which fortunately I copied a description, is validly published. An interesting connection of this work with those of Colombia, making it a logical outcome of the scientific tradition of Mutis and Triana, is that Sr. Hurtado is a graduate of the University of Bogotá.

FRANCIS W. PENNELL.

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Amygdalus persica var. **albo-plena**. WHITE DOUBLE-FLOWERED PEACH.

Location: Arboretum.

Natural distribution: *Amygdalus persica* is a native of China.

This variety is of horticultural origin.

Amygdalus persica var. **roseo-plena**. ROSE DOUBLE-FLOWERED PEACH.

Location: Arboretum.

Amygdalus persica var. **rubro-plena**. RED DOUBLE-FLOWERED PEACH.

Location: Arboretum.

Amygdalus triloba var. **plena**. DOUBLE-FLOWERING PLUM.

Location: Fruticetum.

Natural distribution: *Amygdalus triloba* is a native of China.

This variety is of horticultural origin.

Padus. WILD CHERRY

Padus nana. CHOKE CHERRY.

Location: Arboretum. Fruticetum.

Natural distribution: Eastern North America.

Padus nana var. **leucocarpa**. YELLOW-FRUITED WILD CHERRY.

Location: Arboretum.

Padus Padus. BIRD CHERRY.

Location: Fruticetum.

Natural distribution: Europe and Northern Asia.

Padus virginiana. WILD BLACK CHERRY.

Location: Common about the Garden grounds.

Natural distribution: Eastern North America.

CAESALPINACEAE. SENNA FAMILY

Cercis. JUDAS-TREE**Cercis canadensis.** AMERICAN JUDAS-TREE.

Location: Fruticetum. Arboretum. West Border. Border at approach to Elevated Railroad.

Cercis canadensis var. **alba.** WHITE-FLOWERED AMERICAN JUDAS-TREE.

Location: Fruticetum.

Cercis chinensis (*Cercis japonica*). ASIATIC RED-BUD.

Location: Fruticetum. Near Power House no. 1. Aquatic Garden.

Gymnocladus. KENTUCKY COFFEE-TREE**Gymnocladus dioica.** KENTUCKY COFFEE-TREE.

Location: Arboretum. Fruticetum. Along path from Museum fountain to 200th Street entrance.

Natural distribution: Central United States.

Gleditsia. HONEY LOCUST**Gleditsia aquatica.** WATER LOCUST.

Location: Arboretum.

Natural distribution: Southeastern United States.

Gleditsia triacanthos. HONEY LOCUST.

Location: Arboretum. Along path from Museum fountain to 200th Street entrance.

Natural distribution: Eastern North America.

FABACEAE. PEA FAMILY

Sophora. SOPHORA**Sophora japonica.** JAPAN PAGODA TREE.

Location: Arboretum.

Natural distribution: China.

Sophora viciifolia. VETCH-LEAVED SOPHORA.

Location: Fruticetum.

Natural distribution: China.

Cladrastis. AMERICAN YELLOW WOOD**Cladrastis lutea.** AMERICAN YELLOW WOOD.

Location: Arboretum. Along path near Conservatory Range

1. South of the Mansion.

Natural distribution: Southeastern United States.

Maackia. ASIATIC YELLOW WOOD**Maackia amurensis** var. **Buergeri.** JAPANESE YELLOW WOOD.

Location: Arboretum.

Natural distribution: Japan.

Genista. GENISTA**Genista tinctoria.** DYER'S GREENWEED.

Location: Fruticetum.

Natural distribution: Europe and western Asia.

Laburnum. Golden Chain**Laburnum Laburnum.** GOLDEN CHAIN.

Location: Arboretum. Fruticetum.

Natural distribution: Southern Europe.

Cytisus. TREFOIL**Cytisus hirsutus.** HAIRY TREFOIL.

Location: Fruticetum.

Natural distribution: Central and southern Europe and the Orient.

Cytisus nigricans. BLACKISH TREFOIL.

Location: Fruticetum.

Natural distribution: Central Europe.

Cytisus nigricans var. **elongatus.** SLENDER BLACKISH TREFOIL.

Location: Fruticetum.

Cytisus praecox. EARLY TREFOIL.

Location: Fruticetum.

Horticultural origin.

Cytisus scoparius. SCOTCH BROOM.

Location: Fruticetum.

Natural distribution: Europe.

Cytisus scoparius var. **Andreanus**. CRIMSON-WINGED SCOTCH BROOM.

Location: Fruticetum.

Cytisus supinus. DENSE-FLOWERED TREFOIL.

Location: Fruticetum.

Natural distribution: Southern Europe.

Amorpha. FALSE INDIGO

Amorpha canescens. LEAD-PLANT.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Amorpha fruticosa. COMMON FALSE INDIGO.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Amorpha glabra (*Amorpha montana*). MOUNTAIN FALSE INDIGO.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Amorpha tennesseensis. TENNESSEE FALSE INDIGO.

Location: Fruticetum.

Natural distribution: Tennessee.

Amorpha virgata. WAND FALSE INDIGO.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Kraunhia. WISTERIA

Kraunhia floribunda. JAPANESE WISTERIA.

Location: Fruticetum.

Natural distribution: Japan.

Kraunhia floribunda var. **alba**. WHITE-FLOWERED JAPANESE WISTERIA.

Location: Fruticetum.

Kraunhia floribunda var. **macrobotrys**. LONG-RACEMED JAPANESE WISTERIA.

Location: Viticetum.

Kraunhia floribunda var. **violaceo-plena**. DOUBLE-FLOWERED JAPANESE WISTERIA.

Location: Fruticetum.

CONFERENCE NOTES FOR DECEMBER

A conference of the Scientific Staff and Registered Students of the Garden was held on the afternoon of December 4.

Mr. Edgar Nelson spoke briefly of his scientific work since he was a student at the Garden in 1913-14, reporting especially on inspection and control of the citrus canker in Florida and on measures employed in Texas for the eradication of the Argentine ant which has recently been introduced.

Dr. H. A. Gleason, associate professor of botany at the University of Michigan and a former student of the Garden, was present and reported on his studies of the genus *Vernonia*. The following is an abstract of his discussion.

"Among the sixty or more species of *Vernonia* in the West Indies, there are two introduced species, each representing a distinct section of the genus and two species without any close relationships. There are two or three groups of species without relatives in the West Indies. One group of four Cuban species finds its nearest relatives in Mexico and Central America. Among the other West Indian species which are of South American derivation, the simplest type of inflorescence, a bracted scorpioid spike, occurs in several species distributed as far west as Jamaica. From this simple type, other types of inflorescence have been developed, characterized by shorter and more leafy spikes and by differences in the position of the next vegetative branches. Each stage in the development of the inflorescence is associated with a more westerly distribution, culminating in the species of the Bahamas and Cuba.

"Forms of *Vernonia* which are apparently hybrids occur commonly in the United States. They are found only in the overlapping ranges of each of the supposed parents, whose morphological characters they combine. In many specimens, the achenes are shriveled below and plump only near the apex, indicating their probable sterility."

A. B. STOUT,
Secretary of the Conference.

NOTES, NEWS AND COMMENT

Corporal Kenneth R. Boynton, Head Gardener's Assistant and recently editor of the *Journal*, is expecting to be released from the United States Army in February. He entered the service last May and has been stationed at Camp Hancock, Augusta, Georgia, where he was assigned to the Department of Personnel, assisting in the psychological examination of recruits and in clerical work.

Mr. Truman G. Yuencker, of the University of Illinois, was here for a day recently. He is engaged upon a monographic study of the genus *Cuscuta*.

Volume 32, part 1, of *North American Flora*, containing descriptions of a part of Rubiaceae, by Paul C. Standley, appeared December 28, 1918. It was followed two days later by volume 22, part 6. This contained the concluding pages of Rosaceae (chiefly the genus *Rosa*), by P. A. Rydberg, and the additions and corrections to the first 236 pages of the volume. It is expected that the part needed to complete volume 22 will appear during the present year.

On January 11, about thirty students from Hunter College visited the Garden Museum under the direction of their instructor, Miss Alice W. Wilcox. The object of the visit was to make a study of the collections of fungi and algae to supplement the regular college work in these courses. Dr. Howe acted as guide to the algae and Dr. Seaver to the fungi. Emphasis was laid on the economic uses of these plants.

A large collection of flowering plants from different parts of Cuba has recently been received for the herbarium. These collections supplement those made several years ago by members of the Garden staff.

A set of over one hundred specimens of lichens from Montana has been incorporated in the lichen herbarium. These were collected on the eastern and western slopes of the Rocky Mountain Divide between the years 1887 and 1898 by Mr. R. S. Williams, who presented them to the Garden.

Professor F. S. Earle has been sending a number of specimens of woody and fleshy fungi to the Garden herbarium from Porto Rico, where Mr. Edgar Nelson has now joined him. Regarding the gill-fungi, Professor Earle remarks, under date of December 24, "They are certainly very rare in the region of Rio Piedras, being chiefly represented by species of *Marasmius* and *Lepiota*. They are very local and only appear when weather conditions are just right. I do not doubt, however, that the Island will yet afford a long list of them."

The unusually mild weather has caused the collecting season for fungi to be considerably prolonged. Friends of the Garden sent in a number of specimens for the herbarium which were collected in a fresh, growing condition during the Christmas holidays and early in January.

The second volume of H. L. Gerth Van Wijk's *Dictionary of Plant Names* has recently reached the library. This work, which forms an index to the preceding volume, contains the vernacular names in English, French, German and Dutch, as well as many names in colonial use. The book, which is published by the Dutch Society of Sciences in Haarlem, should prove of considerable value as a work of reference.

Meteorology for December.—The total precipitation for the month was 3.27 inches all of which fell as rain. The maximum temperatures recorded at the Garden for each week were 51° on the 8th, 57° on the 15th, 55° on the 20th, and 60° on the 23d. Minimum temperatures were 19° on the 2d and the 7th, 22° on the 11 and the 19th, and 20° on the 29th.

Meteorology for the year 1918.—The total precipitation at the New York Botanical Garden for the year was 37.98 inches. The distribution by months was as follows: January, 3.86 (including 16.5 inches snow); February, 2.59 (including 2.5 inches snow); March, 1.12; April, 2.36; May, 7.80; June, 4.36; July, 4.11; August 2.55; September, 2.83; October, 0.58; November, 2.55; and December, 3.27.

The maximum temperature for the year was 105° on the 7th of August. The minimum was -6° on the 5th of February. The first hard-killing frost of the autumn was on the morning of November 6 with a temperature of 30°. The earliest date on which ice completely covered the "middle lake" was the 24th of November.

ACCESSIONS

MUSEUMS AND HERBARIUM

2,200 specimens of flowering plants from the Philippine Islands. (By exchange with the Bureau of Science, Manila.)

21 specimens of flowering plants from the coastal regions of the southeastern United States. (By exchange with the U. S. Department of Agriculture.)

284 specimens of flowering plants from Argentina. (Collected by Mr. Walter Fischer.)

46 specimens of flowering plants from South Carolina. (Given by Rev. John Davis.)

300 specimens of flowering plants from Texas. (Collected by Prof. Albert Ruth.)

750 specimens of flowerless and flowering plants from Florida. (Collected by Dr. John K. Small.)

425 specimens of flowering plants and ferns from Cuba. (By exchange with Brother Leon.)

2 specimens of mosses from Maine. (By exchange with Mr. E. B. Chamberlain.)

3 specimens of mosses from the Bahamas. (By exchange with Mr. L. J. K. Brace.)

2 specimens of mosses from North Carolina. (Given by Dr. A. LeRoy Andrews.)

35 specimens from Canadian Rocky Mountains. (By exchange with Mr. Stewardson Brown.)

8 specimens of mosses from Cuba. (By exchange with Brother Hioram.)

36 specimens of mosses from Oregon. (Given by Professor Wm. E. Lawrence.)

72 specimens of algae from Washington. (Collected by Dr. S. M. Zeller.)

32 specimens of hepatics from Cuba. (By exchange with Brother Leon.)

68 specimens of flowering plants from Utah and Colorado. (By exchange with Professor A. O. Garrett.)

1 specimen of *Scleroderma verrucosum* from New York. (By exchange with Mr. John Enequist.)

- 1 specimen of *Steccherinum septentrionale* from Massachusetts. (By exchange with Miss Grace P. Johnson.)
- 3 specimens of fungi from New York. (By exchange with Professor H. M. Fitzpatrick.)
- 1 specimen of *Creonectria coccinea* from Pennsylvania. (By exchange with Professor H. M. Fitzpatrick.)
- 3 specimens of woody fungi from Sullivan County, New York. (Collected by Mr. Percy Wilson.)
- 40 specimens of fleshy and woody fungi from Porto Rico. (By exchange with Professor F. S. Earle.)
- 2 specimens of fungi from Arkansas. (By exchange with Dr. J. F. Brenckle.)
- 15 specimens of fungi from Porto Rico. (By exchange with Prof. F. S. Earle.)
- 19 specimens of fungi from Porto Rico. (By exchange with Prof. F. S. Earle.)
- 1 specimen of *Hymenogaster* from South Carolina. (By exchange with Professor Guy West Wilson.)
- 1 specimen of fungus from New York. (By exchange with Mr. W. H. Ballou.)
- 10 specimens of fungi from Porto Rico. (By exchange with Prof. F. S. Earle.)
- 1 specimen of *Pyropolyporus Everhartii* from New Jersey. (By exchange with Prof. A. H. Graves.)
- 234 specimens of flowering plants from Alaska. (By exchange with A. P. Anderson.)
- 213 specimens of rice. (Given by Mr. E. B. Southwick.)
- 5 specimens of mosses from Me., N.H., & Conn. (By exchange with Miss Annie Lorentz.)
- 21 specimens of mosses from Washington. (By exchange with Dr. S. M. Zeller.)
- 2 specimens of mosses from Florida. (Collected by Miss Jeanette P. Standley.)
- 136 specimens of mosses and hepatics from Cuba. (By exchange with Brother Leon.)
- 60 specimens from Greenland. (Collected by Dr. E. O. Hovey.)
- 290 specimens of ferns and flowering plants from Cuba. (By exchange with Brother Hioram.)
- 176 specimens of flowering plants from Curacao. (By exchange with Harvard University.)
- 2 specimens of peanuts. (Given by Dr. H. H. Rusby.)

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JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

First Assistant



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On edge of prairie west of Lake George, Florida, December 6, 1918.—*Opuntia ammophila* with stout trunk and many branches. Notice the abundant long and slender spines and the small fruits. This is the most abundantly fruited prickly-pear in Florida, except *O. Dillenii*. Owing to the lateness of the season most of the berries have fallen. In spite of the vicious armament the half-wild cattle of the region browse on the young joints of these large plants which often grow in quite extensive colonies.

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THE PRICKLY PEARS OF FLORIDA

(WITH PLATES 224, 225, 226)

Succulent plants grow in most parts of the world; but America can justly claim the most peculiar group of succulents, as well as one with almost endless variety in form.

Since the discovery of America, the cacti have been of general or particular interest to all who have come into contact with them. The early adventurers in the New World, and the explorers, were quick to make the acquaintance of these plants, as is evidenced by the prompt introduction and naturalization of several kinds of prickly-pears in southern Europe, northern Africa, and western Asia. Later others became naturalized in southern Africa, in the East Indies, and in Australia.

The history of the genus *Opuntia* in Florida is quite simple. Reference to this group of plants doubtless exists in the records of the early Spanish expeditioners; but the botanical history apparently dates from the publication of Bartram's "Travels"¹ in which William Bartram gives an account of a large prickly-pear then native in the wilderness lying west of Lake George in the peninsula. This locality was recently visited by the writer, who thus made the first botanical pilgrimage to that still uninhabited region since the Bartrams were there nearly a century and a half ago.

During the last century, as far as well-known descriptive

¹ Travels through North and South Carolina, Georgia, East and West Florida. 161.

floras are concerned: Michaux (1803)¹ does not extend the geographic range of *Opuntia* south of the Carolinas, Pursh (1814)² similarly limits the range southward, Nuttall (1818)³ extends the range to Florida, and Darby (1841)⁴ records a single species as being common in the southern states, while Chapman (1860, 1883, 1897),⁵ records four species for the state. The latest American monograph⁶ of the genus *Opuntia* cites only two species as growing in Florida.

The writer became interested in the prickly-pears of Florida in 1901, when an upright plant with copiously tuberous roots was discovered at Miami. This plant was later described as *Opuntia austrina* and represents the widespread inland species of peninsular Florida. For a decade my work was confined mainly to tropical Florida, and aside from the species just mentioned, only the common and widely distributed coastal forms were encountered. However, a few years ago when opportunities to travel more extensively in the state presented themselves, various heretofore unobserved kinds of prickly-pears came to light. Many parts of the state have now been visited; but little known, as well as almost wholly uninhabited extensive areas, both in the interior and in the eastern and western coastal regions and the unknown country back of Cape Sable still remain to be explored.

In addition to field observations, we have had the advantages offered by the extensive cactus plantation of Mr. Charles Deering at Buena Vista, Florida, in which the writer has had all possible facilities extended to him and where he has introduced to cultivation the species and forms of cacti he has met with in Florida and the other southeastern states. In this plantation, where the prickly-pears have nearly or quite natural conditions and a continuous growing season for twelve months each year, it has been possible to study and compare the vegetative and floral

¹ Flora Boreali-Americana 282.

² Flora Americae Septentrionalis 327.

³ Genera of North American Plants 1: 296.

⁴ Botany of the Southern States, 322.

⁵ Flora of the Southern United States, ed. 1 and 2, 144, ed. 3, 171.

⁶ Contributions from the National Herbarium 3: 355-462.

characters of the several kinds under consideration. Anyone interested in the prickly-pears may secure joints for propagation from the plants growing in the garden at Buena Vista, by addressing the author of this paper.

In 1832 Rafinesque writes thus:¹ "having seen in gardens and herbals several rare or new sp[ecies] of Florida, I will here describe some of them." The first species proposed is *Opuntia (Cactus) maritima* and is said to grow on the seashore from Florida to Carolina. However, Rafinesque's own reference to a previously published work² shows that the name is really founded on a description of Elliott.³ The second species proposed is *Opuntia (Cactus) Bartrami* and is founded on the account of an *Opuntia* in Bartram's "Travels" referred to in the earlier part of this paper. A third species proposed is *Opuntia spinalba* founded on a *Cactus Opuntia* of Lunan. It is said to have grown on the Keys of Florida.

The following schedule is offered as a tentative interpretation of the Florida prickly-pears. The notes and descriptions are based mainly on observations made on plants in the field and on specimens grown in the garden referred to in a preceding paragraph, and in the greenhouses of the New York Botanical Garden.

Interesting discoveries of cacti in Florida have not been confined to the genus *Opuntia*; but different genera have been represented as well. A subsequent paper will deal with other genera of the Cactaceae.

The present era in the studies of prickly-pears dates from the publication of "A Preliminary Treatment of the Opuntioideae of North America,"⁴ in 1908, by Dr. N. L. Britton and Dr. J. N. Rose. In this paper four species of *Opuntia* were recorded from Florida and correctly so as far as the flora of the state was then known.

Publication of this paper is made at this time in order that it may be cited in the forthcoming first volume of the Monograph

¹ Atlantic Journal 146.

² Medical Flora 2: 247. 1830.

³ A Sketch of the Botany of South Carolina and Georgia 1: 537. 1821.

⁴ Smithsonian Miscellaneous Collections 50: 503-539.

of Cactaceae by Dr. N. L. Britton and Dr. J. N. Rose, now in press for the Carnegie Institution of Washington.

KEY TO THE GROUPS AND THE SPECIES

Plants with essentially uniform joints, or sometimes with the joints of the main stem more or less fused into a flattened or subterete trunk; berries constricted or narrowed at the base.

Stems and branches with firmly attached joints: fruits persistent; plants typically freely flowering.

Mature spines white or uniformly gray.

Plants with armed joints (joints or whole plants sometimes individually unarmed); joints of the branches relatively small (less than 2 dm. long): berries purple or red.

Mature plants prostrate, or erect and bushy or diffuse, the joints not fused into a trunk.

I. TORTISPINAE.

Mature plants erect, with the joints of the stem fused into a subterete trunk which is divided above into few or many spreading branches.

II. AMMOPHILAE.

Plants with unarmed joints (joints sometimes individually weakly armed with white spines): joints of the branches relatively large (over 2 dm. long): berries red or orange, said to be sometimes yellow.

III. FICUS-INDICAE.

Mature spines yellow, dark-red, or brown, uniform, discolored, or banded.

Mature spines yellow, or slightly discolored, stout and more or less curved, or very short and mostly hidden in the areolae, not closely spirally twisted: berries narrowly pyriform to obovoid.

IV. DILLENIANAE.

Mature spines red or brown, banded in our species, closely spirally twisted: berries roundish pyriform, conspicuously turgid.

V. ELATIORES.

Stems and branches with loosely attached joints, these readily separating when shocked or touched: fruits early deciduous: plants not freely flowering, but freely propagating by the easily scattered joints.

VI. CURASSAVICAE.

Plants with elongate terete continuous stems, or stem and main branches, the branchlets of thin, flat, dilated joints: berries broadly rounded at the base.

VII. BRASILIENSES.

I. Tortispinae

Plants prostrate, the stem and branches often forming depressed mats of joints: joints dark-green.

Corolla of numerous petals: berries clavate, over 4.5 cm. long.

1. *O. lata*.

Corolla of few petals: berries short-obovoid, less than 3.5 cm. long.

2. *O. Pollardi*.

Plants erect, sometimes copiously branched, thus bushy and diffuse: joints pale-green.

3. *O. austrina*.

II. *Ammophilae*

Plants tree-like, the stout or stocky trunk divided above into few or many divergent branching joints, sometimes semaphore-like: joints gray-green, usually copiously armed.

4. *O. ammophila*.

III. *Ficus-indicae*

Plants robust, more or less tree-like, the thick joints supported on the subterete trunk, mostly about 3 dm. long: corolla large, mostly 8-10 cm. wide: berries red or orange, said to be sometimes yellow.

5. *O. Ficus-indica*.

IV. *Dillenianae*

Areolae bearing 4-13 short spines which seldom exceed the bristles, the joints thus apparently unarmed: corolla short-campanulate.

6. *O. keyensis*.

Areolae bearing 2-6 long spines which much exceed the bristles, the joints thus prominently armed; or individual joints sometimes spineless: corolla rotate.

Spines decidedly flattened, often curved, in clusters of 3-6, from dense clusters of protruding bristles, the joints thus rigidly armed: plants copiously floriferous and fructiferous.

7. *O. Dillenii*.

Spines terete or nearly so, straight, solitary or 2 or 3 together, from small clusters of inconspicuous bristles, the joints not rigidly armed: plants sparingly floriferous and fructiferous.

8. *O. stricta*.

V. *Elatiores*

Plants large, stout, erect, but widely branched, bushy, not fragile: joints thick, but broad: hypanthium broadly turbinate: outer sepals very broad: corolla bright-yellow.

9. *O. zebrina*.

VI. *Curassavicae*

Plants small, prostrate, exceedingly fragile: joints narrow, often as thick as wide: hypanthium narrowly turbinate: outer sepals narrow: corolla lemon-yellow.

10. *O. Drummondii*.

VII. *Brasilienses*

Plants tree-like, the trunk and branchlets strikingly different: young spines pale yellow with brown tips; mature spines gray with brown tip; berries subglobose to oval.

11. *O. brasiliensis*.

1. *Opuntia lata* Small, sp. nov.

Plant prostrate, often radially branched, sometimes forming mats nearly a meter in width, the tip of the branches sometimes assurgent, with elongate cord-like roots: joints elliptic to narrowly obovate, often narrowly so, thick, 0.4–1.5 dm. long, deep-green, sometimes glaucous, especially when young: leaves subulate, 6–11 mm. long, green or purple-tinged: areolae scattered, often conspicuous, sometimes very prominent and densely bristly, the marginal ones, at least, armed: spines slender, solitary or 2 together, pink, turning red or red-banded, at maturity gray or nearly white, nearly terete, slightly spirally twisted: flowers usually several on a joint, conspicuous: sepals subulate to lanceolate, acute: corolla yellow, 7–9 cm. wide; petals numerous, the inner ones broadly obovate to flabellate, arose at the broad minutely mucronate apex: berries clavate, 5–6.5 cm. long, red or red-purple, many-seeded: seeds about 5 mm. in diameter.

Pinelands, northern peninsular Florida.—Type specimens collected twelve miles west of Gainesville, Florida, December, 1917, J. K. Small, in the herbarium of the New York Botanical Garden. Living specimens of the same collection are in the garden at Buena Vista and in the conservatories of the New York Botanical Garden.

The discovery of this plant was recorded by me about a year ago.¹ Since that time the specimens I transplanted from Gainesville to Buena Vista have grown and assumed the habit of the plants in their native habitat. In addition they have flowered freely and fruited. The specimens I brought to the New York Botanical Garden also flowered; but naturally they did not grow to any extent under the necessarily artificial conditions under glass.

Information received from the region where *Opuntia lata* grows naturally, in addition to the personal observations of the writer, indicates that the plants always grow prostrate, just as the writer found them in the winter of 1917. The early joints may either give rise to branches that spread radially and thus form mats, or they may branch more in one direction, thus giving rise to a long string of joints with only a few lateral branches. *Opuntia lata* somewhat resembles *O. Pollardi* in habit; but it differs

¹ Journal of the New York Botanical Garden 19: 74. 1918.

in the usually smaller joints, the long narrow hypanthium, the more numerous petals, and the clavate berries.

2. *OPUNTIA POLLARDI* Britton & Rose, Smithsonian
Misc. Coll. 50: 523. 1908

Plant prostrate, forming irregular mats, somewhat tuberous: joints suborbicular or oval, varying to broadly obovate, usually quite thick, 10–15 cm. long, or sometimes smaller, deep-green: areolae rather conspicuous, much scattered, some of the upper ones, at least, usually armed: spines stout, at maturity gray, usually solitary: flowers solitary or few on a joint: sepals deltoid to broadly rhombic or rhombic-cuneate, acute or mucronate: corolla light yellow, 6–7 cm. long; petals cuneate, broadly truncate and decidedly erose at the apex: berries obovoid, 2.5–3 cm. long, purple, rather many-seeded: seeds 5–6 mm. in diameter.

Pinelands and sand-dunes, coastal plain, North Carolina to northern Florida and Mississippi.

At the time of the publication of the second edition of my *Flora*¹ this plant was known only from southern Mississippi, where it was originally collected nearly twenty years earlier. In the spring of 1917, while in search of the long-neglected *Opuntia Drummondii*, the writer found this species widely distributed in the region north of Apalachicola, and last December he collected it on the hills back of Pensacola. As far as we know now, its range in Florida is confined to the northern part of the state, or, in other words, the coastal plain of the Gulf of Mexico. Recent exploration also brought it to light on the Atlantic coast. While searching for long-lost prickly-pears in the vicinity of Charleston,² South Carolina, in the winter of 1916, I found *Opuntia Pollardi* at several localities in that region, while last fall Mr. W. E. McAtee extended its known range still further northward by collecting specimens on Church's Island, in Currituck Sound, North Carolina.

As will be noticed, by comparing the geographic range of this species with that of *Opuntia Drummondii*, that the distribution of the two species coincides very closely. Last year Professor S. M. Tracy sent specimens of *Opuntia Pollardi*, collected at the

¹ *Flora of the Southeastern United States*, Ed. 2. 817. 1913.

² *Journal of the New York Botanical Garden* 18: 237–246. 1917.

type locality, to the garden at Buena Vista where they are now growing vigorously.

The present species and *Opuntia lata* represent the only kinds in our range with prostrate stems and branches, except the distantly related *Opuntia Drummondii*. *Opuntia Pollardi* is evidently the *Opuntia vulgaris* of Chapman's "Flora" as far as Florida is concerned.

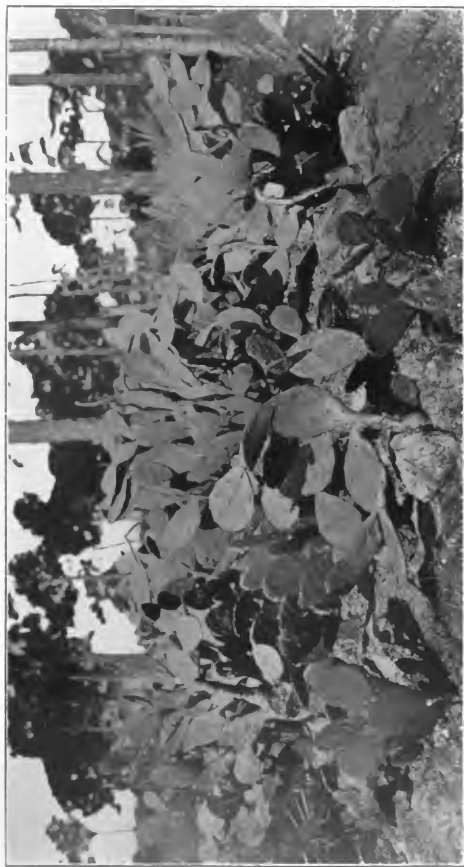
3. *OPUNTIA AUSTRINA* Small, Fl. SE. U. S. 816. 1903

Plant erect, 1 m. tall or less, irregularly branched, tuberous: joints obovate, or nearly elliptic, thinnish, 5-10 cm. long or rarely longer, or much larger in maritime regions, deep-green or bright-green: leaves stout-subulate, 3-7 mm. long, green or purple-tinged: areolae rather prominent, the marginal and upper ones usually armed: spines slender yellowish or reddish, at maturity white or light gray, solitary or 2 together: sepals lanceolate to ovate or rhombic-ovate, acute: corolla 6-7 cm. broad, light-yellow, or sometimes very pale: petals cuneate to obovate, rounded-truncate and mucronate: berries narrowly obovoid or sometimes broadly so, 3-4 cm. long, purple: seeds numerous, 4.5-5 mm. in diameter.

Pinelands and coastal sand-dunes, northern peninsular Florida from the central part to the Atlantic, southward to Cape Sable.

As it is now understood, *Opuntia austrina* represents one of the more widely distributed prickly-pears of Florida. The geographic range seems to extend from the upper part of the lake region eastward to the flatwoods and the eastern coast strip thence southward through the Miami limestone region and Cape Sable. Certain forms from the coastal strip and from the northern part of the range do not agree in full with those from the Miami region, where the species was first described. However, the variations observed may be due to different environments and local conditions, and thus be only superficial. Striking changes in different plants of the same species, caused by somewhat abnormal and slightly disturbed environments, have been observed by the writer, both in continental and insular Florida.

In order to get a better understanding of this species, we have brought together in the plantation at Buena Vista, the various forms now referred to *Opuntia austrina* so that they may be observed as they grow under uniform conditions.



In the cactus plantation at Buena Vista, Florida, May 24, 1918.—*Opuntia keyensis* grown from joints brought from Key Largo about a year previous. Notice the large areolae or clusters of bristles in the joints with no apparent spines. However, this is our most copiously armed prickly-pear. Each areola bears a cluster of from three to thirteen short spines which seldom protrude beyond the bristles. This species differs from all other Florida prickly-pears in its campanulate corolla. Unlike its relative, *O. Dillenii*, the most abundantly fruited species in the state, this is very sparingly fruited.

This was the plant which first aroused my interest in the prickly-pears of Florida, and one of the more striking characters it exhibited was the numerous tuberous roots. For some time it was thought that this character was peculiar to *Opuntia austrina*, but later investigations have shown that *Opuntia Pollardi*, *O. ammophila*, and *O. Drummondi* produce tuberous roots; but none of them to the extent that the species under consideration does.

Opuntia austrina is a short-lived plant. Every year or two the individual plants break down and new ones start afresh either from the tuberous roots or from the old joints. It may be that there is some relation between the fibrous and tuberous rooted species and longevity. At any rate, the plants with fibrous roots seem to be longer lived as individuals than those with tuberous roots.

4. *Opuntia ammophila* Small, sp. nov.

Plant erect, more or less branched throughout or ultimately with a stem 1-2 m. tall or more, becoming 1-2.5 dm. in diameter, bearing several spreading branches near the top, thus tree-like, tuberous at the base: joints various, those of the main stem elongate, ultimately fused on the ends and subcylindric, those of the branches typically obovate or cuneate, varying to elliptic or oval, thickish, 0.5-1.7 dm. long, becoming gray-green: leaves stout-subulate, 6-10 mm. long, green: areolae relatively numerous, conspicuous on account of the densely crowded long bristles, especially on the older joints, the marginal ones, at least, armed: spines very slender, solitary or 2 together, reddish or red, at maturity gray, mostly 2-6 cm. long, nearly terete, scarcely spirally twisted: flowers several on a joint: sepals lanceolate, acute or slightly acuminate: buds sharply pointed: corolla bright-yellow, 5-8 cm. wide: petals cuneate or obovate, notched and prominently apiculate, scarcely erose: stigmas cream-colored: berries obovoid, 2-3 cm. long, more or less flushed with red-purple, many-seeded: seeds about 4 mm. in diameter. [Plate 224.]

Inland sand-dunes (scrub), peninsular Florida.—Type specimens from south of Ft. Pierce, collected in December, 1917, by J. K. Small. They are in the herbarium of the New York Botanical Garden. Living plants are also in the conservatories of the Garden, as well as in the plantation at Buena Vista, Florida.

My attention was first attracted to this species on the large sand-dunes south of Fort Pierce, in a region that has turned out to be the southern end of its geographic range. It reaches its best development, however, in the northern part of its range west of Lake George. It differs from all our other species in the gray-green color, the numerous elongate, very slender, often deflexed, spines, and in the small, thick-obovoid fruits. In spite of its vicious armament, the cattle that range through the country west of Lake George often browse upon it.

This plant is the most conspicuous native prickly-pear in Florida, and curiously enough, in proportion to its striking habit, the most neglected one. It is confined to the so-called "scrub" or inland quiescent sand-dunes which range in a general way through the lake region and the east Florida flat-woods, from the region west of Lake George to that east of Lake Okeechobee.

The first definite record of *Opuntia* in Florida begins with the record of the discovery of a large prickly-pear about the western shores of Lake George by William Bartram in the latter part of the eighteenth century.¹ His account of the plant he observed suggests a form with the habit of *Opuntia Ficus-indica*; but this species could not have been established there at that early date, and, further, he describes the berries as purple and charged with juice. One could imagine that he found a plant or a colony of the plant just described; but its fruits are conspicuously small, at least relatively so in proportion to the size of the plant, and they are not particularly juicy, in fact they are rather dry.

The writer recently visited the country west of Lake George, traveling many miles through it for the purpose of rediscovering the Bartram plant, but without success. If Bartram did find a particularly smooth and large-fruited prickly-pear, such as he describes, the cattle may have exterminated it by this time. Thus the Bartram *Opuntia* still remains a mystery.

¹ Travels through North and South Carolina, Georgia, East and West Florida 161.

5. *OPUNTIA FICUS-INDICA* (L.) Mill. Gard. Dict. Ed. 8.

Opuntia. No. 2. 1768

Cactus Ficus-indica L. Sp. Pl. 468. 1753.

Plant erect, often tree-like, 4 m. tall or less, the early joints somewhat fusing to form a thick trunk which supports irregularly spreading heavy branches: joints elliptic, varying to slightly broadest above the middle or below it, very thick, mostly 3-4 dm. long, often slightly glaucous: areolae small, with yellowish bristles and white wool: spines wanting, or occasionally and irregularly developed, and mostly solitary, pale, at maturity turning white, nearly terete: flowers usually several on a joint: corolla yellow, 7-10 cm. wide: berries obovoid, red or orange (said to be sometimes yellow), 5-9 cm. long: seeds 3.5-4.5 mm. in diameter.

Waste places, roadsides, and old fields, Florida. Doubtless native of tropical America; but its original home is unknown. Naturalized in the Old World.

Two of the species of *Opuntia* now growing naturally in Florida are naturalized exotics. The present plant is apparently a rather recent introduction. The *Opuntia Ficus-indica* of the older floras is evidently based on specimens of the species following the one here described.

The species is apparently represented in several forms. In some places it has escaped from flower-gardens, while in other regions it may be found on roadsides, in fence-corners, and in old fields where it formerly was planted extensively by people who are locally known as "cactus-crazy." This plant does not seem to be of much practical use at present.

6. *Opuntia keyensis* Britton, sp. nov.

Plant erect, much-branched, sometimes forming clumps 3 m. tall, with long fibrous roots: joints elliptic, oval, obovate or spatulate, thick, 1-3 dm. long, bright-green: leaves ovoid, 2-3 mm. long, green: areolae rather conspicuous, often relatively large and prominent, apparently unarmed: spines stout, 4-13 together, very short, mostly hidden in the bristles, pink, at maturity salmon-colored, and sometimes protruding from the areolae as tufts of very coarse bristles, slightly flattened: buds short-pointed: flowers solitary or 2 or 3 on a joint: sepals deltoid to subreniform, acute or acutish: corolla salmon-colored, cup-like or short-campanulate, 3-3.5 cm. wide; petals rather few,

the inner ones broadly obovate or orbicular-obovate, undulate, scarcely, if at all, mucronate: berries obovoid, 4-6 cm. long, purple: seeds numerous. [Plate 225.]

Hammocks, Florida Keys and the Cape Sable region.—Type specimens collected on Boot Key, April, 1909, by N. L. Britton in the herbarium of the New York Botanical Garden.

Our two typically maritime species of *Opuntia* were recorded for many years under names that did not belong to them, as far as the plants growing in Florida were concerned.

This plant is strictly maritime, and has only been found on the Florida Keys and on the shores of the Cape Sable region. It has been confused with several species described long ago, but recent observation both in the field and on plants grown in the garden at Buena Vista have convinced me of its valid claim to specific recognition. It differs from its relative, *Opuntia Dillenii*, both in vegetative and floral characters. Casual observation would determine it as unarmed; but careful examination will disclose it to be in a way our most thoroughly armed kind. The spines are short and stout, so short that they seldom protrude beyond the bristles of the areolae. However, they are often numerous and exist in clusters of as many as thirteen. The flower is unique among the Florida species of *Opuntia*. The corolla instead of being rotate is short-campanulate or cup-shaped. The plants produce flowers and fruits much more sparingly than those of *Opuntia Dillenii*.

This species is evidently the *Opuntia Ficus-indica* of Chapman's "Flora," and it was described under *Opuntia inermis* in the second edition of my "Flora."

7. *OPUNTIA DILLENII* (Ker) Haw. Suppl. Pl. Succ.

79. 1819

Cactus Dillenii Ker, Bot. Reg. 3: under pl. 255. 1818.

Plant erect, rather strict, sparingly branched and much-branched and sometimes diffuse or sometimes 2 m. tall, occasionally somewhat tree-like, with stout fibrous roots: joints elliptic to obovate or oval, thickish, 1-3 dm. long, light-green, often glaucous: leaves ovoid, 2-5 mm. long, usually green: areolae remote but conspicuous, mostly armed: spines stoutish, clustered, usually 3-6 together, flattened, often curved, pale-

yellow, at maturity deeper yellow and often sordid: flowers several on a joint: corolla yellow, salmon, or reddish, rotate, 6-8 cm. wide; petals rather few, the inner broadly cuneate to broadly obovate, often mucronate: berries pyriform, 5-6 cm. long, purple: seeds numerous, 3-4 mm. in diameter.

Hammocks along or near the coast, and sand-dunes, peninsular Florida and the Florida Keys. Bermuda, West Indies, and eastern Mexico.

During the earlier period of Florida botany, *Opuntia Dillenii* was referred to under the specific names of plants to which it is really only distantly related. In fact its identity was not definitely established until the beginning of the present century.

This species is the common and typically maritime prickly-pear of our range, and also the most vigorous of the several different kinds. It is apparently the longest-lived and the healthiest of them all, seemingly wholly free from disease and also from insect pests. It grows either in perpetual shade or in exposed sunny localities and will stand almost any amount of ill-treatment and frequent transplanting for ornamental purpose with impunity.

Although typically maritime and sometimes growing even in mangrove swamps or in low situations where the plants are partly submerged during high tide, it may be found equally vigorous on the high quiescent sand-dunes along the eastern coast of the Florida peninsula.

In addition to producing the strongest and most thorough armament of our species, it is the most prolific in the matter of flowers and fruits. Plants or clumps of plants are often conspicuous on account of large quantities of purple fruits, which are never equalled in numbers in the case of any of our other species. It is the *Opuntia polyantha*, at least in part, of Chapman's "Flora."

8. *OPUNTIA STRICTA* Haw. Syn. Pl. Succ. 191. 1812

(?) *Opuntia Bentonii* Griffiths, Rep. Mo. Bot. Gard. 22: 25. pl. 1 and 2. 1912.

Plant erect, but ultimately diffusely or widely branched, mostly less than 1 m. tall, not tuberous: joints broadly spatulate,

obovate, elliptic, or oval, thinnish, or quite thick at the base of the plant, mostly 1-3 dm. long, bright-green: leaves stout-subulate, 3-9 mm. long, green or purplish-green: areolae rather evenly scattered or more numerous along the edges than on the faces of the joints, few of the upper marginal ones armed, or joints individually unarmed: spines slender, solitary, or 2 or 3 together and sometimes with several shorter ones, pale-yellow, at maturity deeper-yellow, nearly terete, obscurely spirally twisted: flowers showy, mostly few on a joint: sepals lanceolate or ovate-lanceolate: corolla 8-10 cm. wide; petals few, the inner ones broadly obovate or cuneate, some of them mucronate: berries solitary or few on a joint, obovoid, sometimes slightly pyriform, 3.5-5 cm. long, purple.

Sandy woods and roadsides Florida to eastern Texas.

For many years specimens of a prickly-pear of uncertain relationship were collected in Florida. In 1912, Dr. David Griffiths associated the specimens from northern Florida and described them under the name of *Opuntia Bentonii*, making the type specimen a certain collection from near MacClenny, at the same time recording the extension of the geographic range to the mouth of the Brazos River in Texas.

A little later Dr. Britton and Dr. Rose, in the course of their studies in the genus *Opuntia*, associated this plant with *Opuntia stricta*, basing their opinion on the close resemblance of the Florida specimens and those of apparently authentic specimens of *O. stricta* received from European botanical gardens where that plant had long been in cultivation. Still later they began to refer here various hitherto unassigned specimens from peninsular Florida, so that now we know the species to range from the northern extremity of the state to the southern.

One curious point about this plant is that its habitats, as far as the writer has observed, often arouse suspicion that it may be naturalized in Florida, and not a native. In fact, Dr. Griffiths says:¹ "Always in cultivation in the eastern portion of this range and native in southwestern Louisiana and Texas." If the Florida specimens are properly referred to *Opuntia stricta* it is quite likely they are descendants of plants that were brought from Cuba, where it appears to be native, or from some other point

¹ Rep. Mo. Bot. Gard. 22: 25.

in tropical America, or even from Texas, at least in some cases, as there seems to be some variation in those from different localities, for cultivating, and later escaped from gardens where it was planted.

This is, perhaps, the *Opuntia polyantha* of Chapman's "Flora" as far as the Apalachicola part of the range given for that species is concerned.

9. *Opuntia zebrina* Small, sp. nov.

Plant erect, more or less branched, throughout, fully 1 m. tall, or less, the roots fibrous: joints oval or obovate, thickish, mostly 1-2 dm. long, deep-green, sometimes obscurely glaucous: leaves ovoid, 2-3 mm. long, bright-green: areolae scattered, some of them, usually the lower ones, unarmed, the upper ones irregularly armed: spines slender, solitary or 2, 3, or 4, together, red-brown, finely banded, nearly terete, closely spirally twisted: flowers few on a joint, or solitary: sepals deltoid, to deltoid-reniform or nearly reniform: corolla yellow, rotate, 6-7 cm. wide; petals rather numerous, the inner ones broadly-obovate, undulate, minutely mucronate or notched at the apex: berries obovoid, not constricted at the base, 3.5-4.5 cm. long, red-purple: seeds many, 6-7 mm. in diameter. [Plate 226.]

Coastal sand-dunes, Cape Sable, Florida, and the lower Florida Keys.—Type specimens collected on Middle Cape Sable, December, 1917, by J. K. Small, in the herbarium of the New York Botanical Garden.

The only specimens collected on Middle Cape Sable on a cruise to that region in December, 1917, were plants of a prickly-pear. In spite of clouds of mosquitoes that almost defeated the securing of any plants at all, the writer and his associates managed to gather several bags of joints of an *Opuntia* that seemed different from others heretofore observed by us in southern Florida.

The discovery of this plant not only added a new species to our range, but also brought a series of hitherto more southern geographic range, into our limits. It is a conspicuous plant, not only on account of the contrast of its peculiarly deep-green joints and bright-yellow corollas, but also on account of its vigorous growth and continuous healthy condition. A close examination reveals an armament not duplicated in our other

species. The mature spine is very slender, red or brown, more or less banded. It consists of a very close spiral.

Since describing this species from the specimens collected by the writer on Cape Sable, a specimen collected on Boot Key, Florida, in April, 1909, by Dr. N. L. Britton, has been found in the herbarium of the New York Botanical Garden, where it was associated with another plant. In July, 1918, Dr. J. N. Rose discovered the plant on Key West, whence he sent us joints and mature fruits.

In addition to the herbarium specimens cited above, living specimens of the original collection are growing in the cactus garden at Buena Vista and in the conservatories of the New York Botanical Garden. As the plants grow at Buena Vista, they appear to last individually for at least several years, as up to the present there is no sign of the original plants breaking down.

10. *OPUNTIA DRUMMONDII* Graham, The Botanist 5: pl. 246.
1841

Opuntia frustulenta Gibbes, Proc. Ell. Soc. Nat. Hist. 1: 273.
1859.

Opuntia Pes-Corvi Le Conte; Chapm. Fl. S. St. 145. 1860.

Plant prostrate or diffusely sprawling, sometimes forming depressed mats, tuberous: joints ellipsoid, usually narrowly so, or slightly broadest above the middle or below it, very turgid, 3-12 cm. long, light-green or pale-green, loosely attached to each other: leaves ovoid, 3-6 mm. long, green: areolae inconspicuous, the upper ones, at least, armed: spines very slender, solitary or 2, 3, or 4 together, pink, reddish, or red, at maturity gray or even whitish, sometimes darker at the tip, nearly terete: flowers solitary or few on a joint: sepals lanceolate to ovate, acute or acutish: corolla lemon-yellow, 5-6 cm. wide: petals rather few, the inner ones broadly cuneate to obovate, mucronate to emarginate at the apex: berries turbinate-obovoid, 2-3.5 cm. long, purple: seeds few, about 4 mm. in diameter.

Pinewoods and sand-dunes, near the coast, North Carolina to Florida and Alabama.

The history of *Opuntia Drummondii*, together with some notes



In the cactus plantation at Buena Vista, Florida, May 24, 1918.—*Opuntia zebra* grown from joints brought from Cape Sable in the winter of 1917. Many of the prominent areolae or clusters of bristles on the joints are armed with long red and brown striped spines and consequently do not show in the photograph. This prickly-pear has no close relatives in the United States; the related species being found in tropical America. Its red-brown spines and turbinate-obovoid fruits distinguish it from all our other species.

in its habit, has lately been recorded in considerable detail.¹ It is indeed, not strange that this plant, even considering its extensive geographical range, should have remained, until recently, the least known of the older described species of *Opuntia* in the eastern United States.

The exceedingly fragile articulation of the joints was commented on in the papers referred to above. Recent observations have shown that even the wind will separate the joints and scatter them. It may be that this ready method of vegetative propagation has caused the plant to become the shyest bloomer of all our eastern species of *Opuntia*. It may be readily seen that propagation by seeds is almost unnecessary. The crowfoot-cactus, as this plant is sometimes called, grows naturally in the loose sand of pinewoods or in the drifting sands of active dunes. In sheltered spots the branches lie on the surface of the sand; but when in exposed positions the joints naturally partly bury themselves in the sand and thus strings of joints that would otherwise be b'own apart and scattered, are securely anchored in place, at least until the sand may be blown away from the bodies of the joints and from the spines which extend further down into the sand. The phenomena just described not only obtain in the natural habitats of this plant, but they are duplicated on the sand mounds in the cactus plantation at Buena Vista.

Another interesting point in connection with this plant recently impressed on the writer is the similarity in color between the joints and spines on the one hand and the sand in which they grow on the other. The camouflage is usually so complete that one usually feels the presence of the plants before the eye is attracted by them.

The color of the corolla according to both the original plate and to testimony obtained at Apalachicola is lemon-yellow. Dr. Mohr records the corolla as being "rose purplish." The color is various in some species of *Opuntia*, and it may thus vary in this one.

¹ Journal of the New York Botanical Garden 18: 237-246. 1917, and 19: 1-6. 1918.

11. *OPUNTIA BRASILIENSIS* (Willd.) Haw. Suppl. Pl. Succ. 79.
1819 .

Cactus brasiliensis Willd. Enum. Suppl. 33. 1813.

Plant erect, tree-like, 5 m. tall or more, or often much smaller, with a terete upwardly tapering trunk which in mature plants supports terete spreading branches, these in turn divided into branching flat oblong, elliptic, or obovate relatively thin leaf-like, bright-green joints: leaves ovoid, mostly 1-3 mm. long, light-green: areolae small, minutely white-woolly, those of the stem, branches, and edges of the joints armed: spines slender, usually solitary, terete, mostly 1-3 cm. long, pale with reddish or brown tips, ultimately gray: flowers usually several on the terminal joints: sepals ovate, the inner ones broadly so: corolla lemon-yellow, mostly 3-4 cm. wide: berries subglobose to oval, 2.5-4 cm. long, light yellow, the areolae conspicuous on account of the tufted brown bristles.

Woods, eastern peninsular Florida. Native of eastern South America.

Among the eleven species of *Opuntia* growing naturally in Florida, only two are introduced and naturalized plants. The present species, although sometimes seen in and about gardens, has not been definitely determined as a naturalized plant until quite recently. However, like many other cultivated exotics, it may be more extensively naturalized than we now know. Last November, John Soar and Charles T. Simpson collected specimens of *Opuntia brasiliensis* on a shell mound south of Daytona, Florida. Although there is no habitation near the spot, at present, I have been informed that there is evidence that long ago a house and garden may have stood there. This would account for the occurrence of this prickly-pear now growing on the shell mound.

To sum up: We definitely know eleven species of prickly-pears growing naturally in Florida, nine native kinds (*Opuntia lata*, *O. Pollardi*, *O. austrina*, *O. ammophila*, *O. keyensis*, *O. Dillenii*, *O. stricta*, *O. zebrina*, *O. Drummondii*), and two naturalized exotics, (*Opuntia Ficus-indica*, *O. brasiliensis*). Six of the native species are endemic (*Opuntia lata*, *O. austrina*, *O. ammophila*, *O. keyensis*, *O. zebrina*), three are found in other states (*Opuntia*

Pollardi, *O. stricta*, *O. Drummondii*), while one species (*Opuntia Dillenii*) is widely distributed in tropical America. Two species (*Opuntia lata*, *O. Pollardi*) are typical of inland pinelands. One species (*Opuntia ammophila*) is confined to the ancient quiescent sand-dunes or scrub, and the adjacent prairies and pinelands, while two species (*Opuntia austrina*, *O. Drummondii*) occur on the active sand-dunes and in the inland pinelands. Three species (*Opuntia keyensis*, *O. Dillenii*, *O. zebrina*) are typically maritime and grow almost always in hammocks or on coastal dunes near hammocks.

Among the native species three (*Opuntia lata*, *O. Pollardi*, *O. Drummondii*) are prostrate, while six (*Opuntia austrina*, *O. ammophila*, *O. Keyensis*, *O. Dillenii*, *O. stricta*, *O. zebrina*) are erect, some of them merely bushy, others tree-like.

JOHN K. SMALL.

DR. HENRY ALLAN GLEASON APPOINTED FIRST ASSISTANT

Dr. Henry Allan Gleason has been appointed the First Assistant of the Director-in-Chief, succeeding Dr. W. A. Murrill, who has been transferred to the new position of Supervisor of Public Instruction.

Dr. Gleason is 37 years old; he was graduated from the University of Illinois in 1901, received his Master of Arts degree from his alma mater in 1904, and his degree of Doctor of Philosophy from Columbia University in 1906. He studied at the New York Botanical Garden in 1905, 1906, 1913, and again in 1918, and at the Missouri Botanical Garden in 1904. From 1901 until 1910 he served as assistant and later as instructor in the botanical department of the University of Illinois, except during one year, while he was a fellow of the Ohio State University. Since 1910 he has been on the faculty of the University of Michigan, first as Assistant Professor of Botany, and later as Associate Professor, and since 1915 he has been Director of the Botanical Garden and Arboretum of that institution. Dr. Gleason's

special interest in plant life are ecology and geographic distribution; his published papers include over 40 titles. He has traveled widely in the United States, and in 1913-14 made an Asiatic trip for the purpose of studying at the Dutch Botanical Garden at Buitenzorg, Java. Dr. Gleason is married and has two children.

N. L. BRITTON,
Director-in-Chief

THE USE OF PLANTS IN DECORATIVE DESIGN

In their desire to be of service to designers and students of design, the New York Botanical Garden and the Metropolitan Museum have devised a new field for their joint efforts in a projected exhibition to be held in Class Room B of the Museum from March 15 to April 20. This will display designs in which plant motives are used, selected from the Museum collections, and living plants themselves, provided by the Botanical Garden.

Plant life has been a source of inspiration to designers since prehistoric times. A few typical plants have been used throughout the whole history of design. This fact the exhibition will take into account and will group about those chief motives examples of design dating from different periods and in various materials.

The exhibition will not, however, be exclusively historical but will include a group of plants not yet used to any appreciable extent as decorative motives but admirably adapted to design. Our native flora, in fact, offers to the modern designer, who often has followed the traditions of the European schools, an almost unexplored but invitingly attractive field.

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Kraunhia macrostachya. LONG-CLUSTERED WISTERIA.

Location: Viticetum.

Natural distribution: South central United States.

Kraunhia sinensis. CHINESE WISTERIA.

Location: Viticetum.

Natural distribution: China.

Robinia. LOCUST

Robinia hispida. ROSE ACACIA.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Robinia Kelseyi. KELSEY'S ROSE ACACIA.

Location: Fruticetum.

Natural distribution: Southern Alleghany Mountains.

Robinia neo-mexicana. NEW MEXICAN LOCUST.

Location: Fruticetum.

Natural distribution: Southwestern United States.

Robinia Pseudacacia. LOCUST-TREE.

Location: Arboretum.

Natural distribution: South central United States.

Robinia Pseudacacia var. **Decaisneana.** ROSE-FLOWERED LOCUST-TREE.

Location: Arboretum.

Robinia Pseudacacia var. **inermis.** SPINELESS LOCUST-TREE.

Location: Fruticetum.

Robinia Pseudacacia var. **Rehderi.** DWARF LOCUST-TREE.

Location: Fruticetum.

Robinia viscosa. CLAMMY LOCUST.

Location: Fruticetum. Arboretum.

Natural distribution: Virginia to Georgia.

Colutea. BLADDER SENNA

Colutea arborescens. TALL BLADDER SENNA.

Location: Fruticetum.

Natural distribution: Southern Europe and northern Africa.

Colutea orientalis. ORIENTAL BLADDER SENNA.

Location: Fruticetum.

Natural distribution: Southeastern Europe and the Orient.

Halimodendron. SALT TREE**Halimodendron halodendron.** SALT TREE.

Location: Fruticetum.

Natural distribution: Central Asia.

Caragana. PEA-TREE**Caragana Caragana.** COMMON PEA-TREE.

Location: Fruticetum.

Natural distribution: Siberia and Manchuria.

Caragana Chamlagu. CHAMLAGU PEA-TREE.

Location: Fruticetum.

Natural distribution: Northern China.

Caragana frutex. CHINESE PEA-TREE.

Location: Fruticetum.

Natural distribution: Southern Russia to China.

Caragana microphylla. SMALL-LEAVED PEA-TREE.

Location: Fruticetum.

Natural distribution: Siberia and China.

Caragana pygmaea. PIGMY PEA-TREE.

Location: Fruticetum.

Natural distribution: Caucasus to Siberia and Thibet.

Coronilla. CORONILLA**Coronilla Emerus.** SCORPION SENNA.

Location: Fruticetum.

Natural distribution: Southern Europe.

Lespedeza. BUSH-CLOVER**Lespedeza bicolor.** JAPANESE BUSH-CLOVER.

Location: Fruticetum.

Natural distribution: Amur Region, northern China and Japan

Peuraria. KUDZU VINE**Pueraria hirsuta** (*Pueraria Thunbergiana*). KUDZU VINE.

Location: Viticetum.

Natural distribution: Japan.

RUTACEAE. Rue Family

Zanthoxylum. PRICKLY ASH**Zanthoxylum americanum.** PRICKLY ASH.

Location: Fruticetum. Economic Garden.

Natural distribution: Northeastern United States.

Zanthoxylum Bungei. BUNGE'S PRICKLY ASH.

Location: Fruticetum.

Natural distribution: Northern and central China.

Zanthoxylum micranthum. SMALL-FLOWERED PRICKLY ASH.

Location: Fruticetum. Arboretum.

Natural distribution: China.

Zanthoxylum schinifolium. JAPANESE PRICKLY ASH.

Location: Fruticetum.

Natural distribution: Japan and Korea.

Ptelea. HOP TREE**Ptelea trifoliata.** HOP TREE.

Location: Fruticetum.

Natural distribution: Eastern United States.

Ptelea trifoliata var. **aurea.** GOLDEN HOP TREE.

Location: Fruticetum.

Ptelea trifoliata var. **mollis.** HAIRY HOP TREE.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Phellodendron. CORK TREE**Phellodendron amurense.** AMOOR CORK TREE.

Location: Arboretum.

Natural distribution: Northern China, Amurland, and Japan.

Phellodendron japonicum. JAPANESE CORK TREE.

Location: Arboretum.

Natural distribution: Central Japan.

Phellodendron sachalinense. SACHALIN CORK TREE.

Location: Arboretum. Along walk, Museum to 200th Street entrance.

Natural distribution: Saghalin, Corea, northern Japan, and western China.

Poncirus. TRIFOLIATE ORANGE**Poncirus trifoliata.** TRIFOLIATE ORANGE.

Location: Fruticetum.

Natural distribution: Northern China.

SIMARUBACEAE. Ailanthus Family

Ailanthus. TREE-OF-HEAVEN**Ailanthus glandulosa.** TREE-OF-HEAVEN.

Location: Arboretum. 200th Street entrance.

Natural distribution: China.

MELIACEAE. Mahogany Family

Toona. BASTARD CEDAR**Toona sinensis.** CHINESE BASTARD CEDAR.

Location: Arboretum.

Natural distribution: Northern China.

BUXACEAE. Box Family

Buxus. BOX**Buxus japonica.** JAPANESE BOX.

Location: Fruticetum.

Natural distribution: China and Japan.

Buxus microphylla. SMALL-LEAVED BOX.

Location: Fruticetum.

Natural distribution: Japan.

Buxus sempervirens. COMMON BOX TREE.

Location: Fruticetum.

Natural distribution: Europe and Asia.

Buxus sempervirens var. **angustifolia.** NARROW-LEAVED BOX.

Location: Fruticetum.

Buxus sempervirens var. **angustifolia aurea.** GOLDEN NARROW-LEAVED. BOX.

Location: Fruticetum.

Buxus sempervirens var. **aurea.** GOLDEN BOX.

Location: Fruticetum.

Buxus sempervirens var. **Handsworthii.** HANDSWORTH'S BOX.

Location: Fruticetum.

Buxus sempervirens var. **macrophylla.** LARGE-LEAVED BOX.

Location: Fruticetum.

Buxus sempervirens var. **navicularis.** CHANNEL-LEAVED BOX.

Location: Fruticetum.

Buxus sempervirens var. **rotundifolia.** ROUND-LEAVED BOX.

Location: Fruticetum.

NOTES, NEWS AND COMMENT

Thrushes were well represented in the Garden during 1918. Most of the species, including two Bicknell thrushes, were seen. The wood duck, mother of two in 1917, had a family of nine last year and all survived. A rose-breasted grosbeak remained through the season and two chats were seen in migration. A merganser was a novelty.—F. H. HOUGHTON.

Mr. Ivan M. Johnston has recently sent to the Garden herbarium a large and valuable collection containing over 100 numbers of woody and fleshy fungi, collected in the mountains about Claremont, California. The collection is accompanied by valuable field notes and sketches. Several species that have been known very imperfectly are represented by a number of good specimens in this collection.

Mr. John H. Slocombe, originator of some of the most desirable varieties of dahlias now in cultivation, died in New Haven, Connecticut, on January 11, in his seventy-fifth year. Last

spring he generously contributed roots of thirty-eight choice varieties to the new dahlia border of the Garden, as acknowledged in the JOURNAL for August, 1918.

On January 22, 300 pupils from Evander Childs High School visited the Garden to study living tropical plants, hardy trees, and plant products. They were in charge of Mr. Mann and some of his teachers, assisted by several members of the Garden staff. Mr. Hewitt gave an interesting illustrated lecture on forestry in the large lecture hall in the museum building. The weather was mild and the work of the pupils very satisfactory.

A persistent search was made by Dr. A. H. Graves in the vicinity of New York City during the growing season of 1918 for chestnut trees that had escaped the ravages of the chestnut canker, but no immune trees were found. However, a number of trees were located, which, according to Dr. Graves, give promise of highly resistant strains through inbreeding and crossing with resistant oriental species.

Last summer, Mr. Eckstein Case presented to the Garden a series of water-color paintings made by his sister, Miss Mary Case, late of Cleveland, Ohio. These are on 225 loose sheets and illustrate about 425 species of native American wild flowers from various parts of the United States, and two from the Giant's Causeway, Ireland. Flowers and fruits of many of the species are figured, illustrating some very rare and interesting plants. These have been placed in two albums, and deposited in the library. Besides these, Miss Case's copy of Mrs. Dana's "How to know the Wild Flowers" was also presented. It is beautifully hand-colored with 383 illustrations, evidently done from living plants.

The unusually mild winter has permitted much work on the grounds, which in ordinary winter seasons would have been im-

possible. By the aid of subscriptions by members of the Corporation and of the Women's Auxiliary, we are giving needed employment to laborers engaged in necessary rock excavation at conservatory range 2 and near the museum building, thus obtaining stone for the Telford foundations of paths through the magnolia, oak and birch collections in the arboretum, and through the site of the war memorial grove of Douglas spruce to be planted in the spring, described in the January issue of the *Journal*. Much earth excavation and grading along these new paths has also been accomplished. These new paths, which were much needed, are 10 feet wide and, collectively, over 1600 feet in length. They are now being surfaced with fine ashes from the power house.

Meteorology for January.—The total precipitation for January was 3.21 inches, including a very light fall of snow (about 0.50 inches snow measurement) on the 8th and 9th. The maximum temperatures recorded at the Garden for each week were 60° on the 2d, 42° on the 8th, 50° on the 16th, 51° on the 26th and 52° on the 27th. The minimum temperatures were 13° on the 5th, 7° on the 12th, 23° on the 20th, 25° on the 25th and 29° on the 28th.

ACCESSIONS

MUSEUMS AND HERBARIUM

- 1 specimen of *Gymnopus velutipes* from Michigan. (By exchange with Mrs. Wallis Craig Smith.)
- 25 specimens, "*Fungi Utahensis*"; fascicle 10. (Distributed by Professor A. O. Garrett.)
- 1 specimen of *Hymenogaster* from South Carolina. (By exchange with Professor Guy West Wilson.)
- 1 specimen of *Entoloma strictum* from Massachusetts. (By exchange with Mr. Simon Davis.)
- 200 specimens, "North American Uredinales," Centuries 20 and 21. (Distributed by Mr. Elam Bartholomew.)
- 2 specimens of fungi from Porto Rico. (By exchange with Professor F. S. Earle.)

1 specimen of *Aleurodiscus Oakesii* from Montana. (Collected by Mr. R. S. Williams.)

LIBRARY ACCESSIONS FROM NOVEMBER 1, 1918, TO JANUARY 31,
1919

- American rose annual.* Vol. 2. Ed. 2., Vol. 3. Harrisburg, 1917, 1918.
COSTANTIN, JULIEN NÖEL. *Les Mucedinées simples.* Paris, 1888.
DIXON, ROYAL, & FITCH, FRANKLIN EVERETT. *The human side of trees.* New York, 1917. (Given by Mrs. N. L. Britton.)
FERRY DE LA BELLONE, CAMILLE DE. *La truffe.* Paris, 1888.
GERTH VAN WIJK, H. L. *A dictionary of plant-names.* Vol. 2. The Hague, 1916.
HARDING, ALICE. *The book of the peony.* Philadelphia, 1917. (Given by Mrs. N. L. Britton.)
KELLY, HOWARD ATWOOD. *Some American medical botanists commemorated in our botanical nomenclature.* Troy, 1914. (Given by Dr. J. H. Barnhart.)
LETELLIER, JEAN BAPTISTE LOUIS. *Figures des champignons servant de supplément aux planches de Bulliard.* Ed. 2. Meilhac [1841].
LOVELL, JOHN H. *The flower and the bee.* New York, 1918. (Given by Mrs. N. L. Britton.)
MICHAEL, EDMUND. *Führer für Pilzfreunde.* 3 vols. Zwickhau i. S. 1898-1905.
MURRILL, WILLIAM ALPHONSO. *Three young Crusoes.* Bronxwood Park, 1918. (Given by Dr. W. A. Murrill.)
NYLANDER, WILLIAM. *Observationes circa Pezizas Fenniae.* [Helsingfors, 1869.]
OLIVER, GEORGE W. *Plant culture.* Ed. 3. New York, 1912. (Given by Mrs. N. L. Britton.)
ROMELL, LARS GUNNAR. *Dr. M. A. Lindblads swampbok.* Stockholm, 1902.
TRATTINICK, LEOPOLD. *Fungi austriaci, iconibus illustrati.* Wien, 1805-[06].
TRELEAVE, WILLIAM. *Winter botany.* Urbana, 1918. (Given by Mrs. N. L. Britton.)
WUNSCH, FRIEDRICH OTTO. *Flore générale des champignons.* Paris, 1883.

PLANTS AND SEEDS

- 1 plant of *Juglans cordiformis*. (Given by Mr. J. F. Jones.)
5 plants of *Erica*. (By exchange with Harvard Botanic Garden.)
235 plants for herbaceous collections. (Collected by Mr. E. B. Southwick.)
32 orchids for conservatories. (Given by Mrs. Henry Marquand.)
5 plants of *Rhipsalis*. (By exchange with Bureau of Plant Industry.)
5 plants of *Hylocereus*. (Given by Mr. G. A. Lind.)
3 plants of *Cereus*. (Given by Mr. W. H. Becker.)
2 orchid plants. (By exchange with Lager & Hurrell.)
5 plants for conservatories. (Given by Mrs. J. B. Trevor.)
4 plants of *Lantana Camara*. (Given by Mrs. C. D. Dickey.)
25 plants, mostly palms, for the conservatories. (Given by Mrs. Finley J. Shepard.)
1 plant of *Mamillaria* from New Mexico. (Given by Mr. W. H. Long.)
2 plants of *Opuntia Stanleyi*. (By exchange with Dr. D. T. MacDougal.)
6 plants of *Mesembryanthemum* from California. (Given by Dr. H. M. Richards.)

- 2 plants of *Cattleya Trianae*. (Given by Mr. Adam Muller.)
- 1 plant of *Strobilanthus Dyerianus*. (By exchange with Mr. S. Untermyer.)
- 198 plants for conservatories from Ecuador. (Collected by Dr. J. N. Rose.)
- 43 plants for herbaceous grounds. (Collected by Dr. F. W. Pennell.)
- 2 plants of *Peperomia* from Florida. (Collected by Dr. J. K. Small.)
- 21 plants for conservatories from Florida. (Collected by Dr. J. K. Small.)
- 2 orchid plants for conservatories from Florida. (Collected by Dr. J. K. Small.)
- 16 plants for conservatories. (By exchange with U. S. National Museum, through Dr. J. N. Rose.)
- 1 plant of *Agave decipiens* from Key West, Fla. (Collected by Dr. J. N. Rose.)
- 205 plants derived from seeds from various sources.
- 2 packets of seeds of *Ochroma*. (Given by Mr. W. W. Rowlee.)
- 2 packets of oak seed. (By exchange with Indiana Board of Forestry Service.)
- 144 packets of seeds from Colombia. (Collected by Dr. F. W. Pennell.)
- 1 packet of seed of *Ochroma tomentosa* from Colombia. (Collected by Rusby & Pennell.)
- 15 packets of seeds from Colombia. (By exchange with Ministerio de Agric. y Comercio, through Mr. M. T. Dawe.)
- 2 packets of seed of *Ilex verticillata*. (Given by Mrs. N. L. Britton.)
- 1 packet of seed of *Picrodendron baccatum*. (Given by Mr. Wm. Harris.)
- 14 packets of seed. (By exchange with Hort. Sect. Ministry of Agric., Giza, Egypt.)
- 2 packets of seed. (Given by Mrs. W. W. Heaton.)
- 2 packets of *Robinia* seed. (Given by Mr. H. G. Wolfgang, through Dr. J. K. Small.)
- 5 packets of seed of *Quercus virginiana*. (Collected by Dr. J. K. Small.)
- 1 packet of seed of *Arisaema* sp. from Florida. (Collected by Dr. J. K. Small.)
- 1 packet of Florida seed. (Collected by Dr. J. K. Small.)
- 1 packet of *Opuntia* seed from North Carolina. (Given by Mr. W. L. McAtee.)
- 1 packet of seed of *Paurotis Wrightii*. (Given by Mr. C. A. Mosier.)
- 4 packets of Cuban seed. (Given by Bro. Leon.)
- 2 packets of seed. (By exchange with Bureau of Plant Industry.)
- 1 packet of *Solanum* seed. (Given by H. J. Corfield.)
- 1 packet of seed of *Sparganium acaule*. (Collected by Mr. P. Wilson.)
- 1 packet of seed of *Coffea arabica*. (Given by Dr. H. H. Rusby.)
- 1 packet of *Sapindus* seed from Colombia. (Collected by Dr. H. H. Rusby.)

JOURNAL

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The New York Botanical Garden

EDITOR

H. A. GLEASON

First Assistant

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Conservatory Range No. 1, and Flower Gardens

JOURNAL
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March, 1919

No. 231

INSTRUCTION IN GARDENING FOR CONVALESCENT
SOLDIERS AND SAILORS

(WITH PLATES 227, 228 AND 229)

At a meeting of the Executive Committee of the Board of Managers held October 3, 1918, the president was authorized to offer the facilities of the Garden to the United States Government for instruction of convalescent soldiers and sailors in practical gardening and related subjects, to which civilians may also be admitted. After consultation and correspondence with officials of government departments, the following letter was written:

THE NEW YORK BOTANICAL GARDEN

November 29, 1918.

THE FEDERAL BOARD FOR VOCATIONAL EDUCATION

280 Broadway

New York City

Gentlemen: The New York Botanical Garden in Bronx Park, New York City, desires affiliation with the Federal Board for Vocational Education, for the vocational training of convalescent soldiers and sailors in practical gardening. The Garden is prepared, in case the necessary funds can be secured, to offer such instruction at once. Land, laboratories, greenhouses, lecture-rooms, museum, and library are immediately available, as well as the services of some members of the staff. Necessary fees may be made the subject of mutual agreement.

The following outlined curriculum may be put into operation if a sufficient number of persons desire such instruction and apply for it. The complete course would be distributed over two years, and certificates issued. Partial elective courses would

require much shorter periods. The greenhouse practice, and much of the lecture and laboratory work would be carried on during the winter, the out-of-door work from spring until autumn. After the inception of the work new students would be admitted every three months, taking up the courses wherever they should be in progress at such times.

Yours very truly
(Signed) W. GILMAN THOMPSON
President

PRELIMINARY OUTLINE OF INSTRUCTION IN GARDENING FOR CONVALESCENT SOLDIERS AND SAILORS

- A. Lectures, Field, Museum and Laboratory Work to include:
1. Soils.
 2. Plant Chemistry.
 3. Elementary Botany.
 4. Plant Physiology.
 5. Garden Botany.
 6. Garden Zoölogy.
 7. Garden Pathology.
 8. Garden Mycology.
 9. Garden Design.
 10. Special lectures and demonstrations on kindred subjects, such as Forestry; Native Wild Plants; Tropical Botany; Tropical Gardening; Old World Gardens; Uses of Plant Products; Bacteriology; Meteorology; Canning and Preserving; Husbandry.
- B. Practical Instruction to include:
1. Greenhouse Practice.
Preparation of soil. Fertilizers. Sowing. Care of Seedlings. Watering. Potting. Transplanting. Weeding. Propagation by Cuttings. Care of bulbs, tubers and roots. Control of pests. Use of pits and frames.
 2. Vegetable and Fruit Gardening.
Selection of sites and soil. Preparation of soil. Fertilizers. Spading. Trenching. Drainage. Hoeing. Raking. Sowing. Weeding. Transplanting. Selection of kinds of Fruits and Vegetables. Cultivation. Watering. Spraying.

Harvesting. Cold Frame Practice. Collecting Seeds.
Winter Care of Vegetables and of Fruits.

3. Flower Gardening.

Selection of sites and soil. Preparation of soil. Fertilizers. Spading. Trenching. Drainage. Hoeing. Raking. Sowing. Weeding. Transplanting. Cultivation. Watering. Selection of kinds of Flowers. Spraying. Collecting Seeds. Cold Frame Practice. Mulching. Propagation. Care of roots and tubers. Cutting and arrangement of Flowers. Water Gardens. Rock Gardens.

4. Nursery Practice.

Planting and Transplanting. Cultivation. Watering. Weeding. Spraying. Grafting. Budding.

5. Care of Trees and Lawns.

Pruning and Spraying of Trees. Elimination of Boring Insects. Top-Dressing. Mowing and Weeding of Lawns. Felling Trees. Treatment and Care of Woodlands.

6. Garden Carpentry and Painting.

7. Training of Teachers for School Gardens.

Special six-weeks courses in spring and summer.

On December 18, 1918, the Federal Board for Vocational Education, following consultations with its officials, submitted a form (V R 91) to be filled out giving details of organization and personnel of instructors, which was returned to that Board on December 21, 1918. After further consultation, the following correspondence ensued:

THE NEW YORK BOTANICAL GARDEN

January 9, 1919

MR. ARTHUR W. GRIFFIN, Acting D. V. O.

Federal Board for Vocational Education

280 Broadway, New York City

My dear Mr. Griffin:

In consultation with Dr. W. Gilman Thompson, after my interesting interview with you yesterday, when we discussed the formation of a class for instruction in gardening here, as outlined in previous consultations and communications, we suggest that instead of taking up your plan for assembling students elsewhere in the city or vicinity until six or eight are brought together, that the assembling be done here.

We could receive the men one at a time and put them under informal instruction in our greenhouses, laboratories, library, and museum until the requisite number to form a class were obtained, and after that pass to the formal system of instruction as outlined; this would essentially treat the men as special students during the period of the formation of a class.

If this modification should meet with your approbation, you might send us men at any time.

Yours sincerely

(Signed) N. L. BRITTON
Director-in-Chief

FEDERAL BOARD FOR VOCATIONAL EDUCATION

Division of Rehabilitation
District Vocational Office
280 Broadway, New York

January 10, 1919

DR. N. L. BRITTON, Director-in-Chief
New York Botanical Garden
Bronx Park, New York City

Dear Dr. Britton:

I beg to thank you for your valued favor of the 9th inst. which establishes an arrangement for induction of students into your courses on an ideal basis.

On my visit to Washington yesterday I discussed this at length with Mr. Hamilton, who is in charge of training courses. He is intensely interested in the possibilities that may be developed at the New York Botanical Garden, and has asked me to learn from you what might be offered in the way of advanced courses beyond the training you have already outlined.

A copy of your letter of the 9th is being forwarded to Mr. Hamilton for his information.

Yours very truly

(Signed) ARTHUR W. GRIFFIN
Acting D. V. O.

THE NEW YORK BOTANICAL GARDEN

January 14, 1919

MR. ARTHUR W. GRIFFIN, Acting D. V. O.
Federal Board for Vocational Education
280 Broadway, New York City

My dear Mr. Griffin:

I have your valued letter of January 10th. We submitted the whole plan at a meeting of the Garden Board of Managers yester-



View in the Pinetum, the Museum Building in the Distance

day, and received full authority to carry it into effect, so we can accept students at any time you send them. All details were referred to the President and the Director-in-Chief with power.

As regards the question by Mr. Hamilton, relative to advanced courses beyond the training we have already outlined, I would say that we are completely equipped to develop such courses in many subjects, such as plant breeding, plant selection, plant diseases, and various other experimental lines, and will be glad to do this.

Yours very truly

(Signed) N. L. BRITTON
Director-in-Chief

THE NEW YORK BOTANICAL GARDEN

January 15, 1919

MR. ARTHUR W. GRIFFIN, Acting D. V. O.

Federal Board for Vocational Education
280 Broadway, New York City

My dear Mr. Griffin:

I transmit herewith the following resolutions adopted by the Board of Managers of the New York Botanical Garden at a meeting held on January 13, 1919:

Resolved: That the general plan submitted by the President for the instruction of convalescent soldiers and sailors in Practical Gardening in cooperation with the Federal Board for Vocational Education, be and hereby is approved.

Resolved: That the curriculum for such instruction, prepared by the Director-in-Chief and approved by the Scientific Directors at their meeting of December 14th, 1918, be and is hereby adopted, subject to such modifications as may be found desirable by the Scientific Directors.

Resolved: That the further organization of this instruction, including authority to ask for financial support, to establish fees, to admit civilians, to detail present employees, to employ additional lecturers and assistants and to obtain necessary equipment, be and hereby is referred to the President and the Director-in-Chief with power.

Mr. Mike Wozniak, mentioned in your letter of January 8th, reported here this afternoon, and will be admitted as the first student.

There appear to be only two matters to which further consideration should be given at the present time:

1. As to fees and their method of payment, in which we wish to meet your views. We suggest that the fee be placed at \$15 a month, or \$180 a year. Should we send you bills for such dues?
2. As to discipline. We have assumed that ordinary rules of discipline would be sufficient, enabling us to expel students for cause, but only after a presentation of the facts in such possible cases to you, and we may hope that no such cases will arise.

Yours very truly

(Signed) N. L. BRITTON
Director-in-Chief

Both of the matters referred to in the preceding letter were immediately determined affirmatively. The first student was registered on January 16, 1919, and up to the time of printing this document nine students have been admitted. The men were referred to practical work in greenhouses and out-of-doors, in charge of foreman gardeners, until the end of February, and on the first Monday in March formal instruction as a class was commenced. The following circular was then issued:

THE NEW YORK BOTANICAL GARDEN

INSTRUCTION IN GARDENING

1919

OPPORTUNITIES

An excellent opportunity for pleasant and profitable employment is now offered to men in practical gardening. In commercial and private greenhouses the demand for trained men is far beyond the supply. Public parks need foremen and superintendents who understand all phases of ornamental gardening. A continually increasing number of private estates are employing gardeners and require men trained not only in gardening proper, but in the elements of landscape design, road and path making, and the general care of gardens and grounds. Heretofore most of the gardeners have been British, Dutch, or Germans, trained in gardening before emigrating to America. Since immigration has ceased, the demand for gardeners must in the future be filled by Americans. During the war the wages paid to gardeners have steadily increased. While they do not yet equal the wages in some industrial pursuits, the gardener has many other compensations. His position is not temporary, his work is pleasant, healthful, and diversified, and in many cases gardeners on private estates have their house and vegetable garden furnished and live in unusually attractive situations.

To meet the growing demand for trained gardeners, the New York Botanical Garden has established courses of instruction in gardening and has extended its remarkable facilities to the students.

FACILITIES

The grounds of the Botanical Garden occupy nearly 400 acres of Bronx Park, New York City. They are traversed by the Bronx River and adorned by several small lakes. Part of the ground is occupied by natural woodlands and the remainder has been laid out by trained landscape architects into ornamental plantings, including flower beds, rose and iris gardens, shrubbery

and arboretum, and the whole area is intersected by miles of walks and drives. The grounds alone offer an object lesson in all details of outdoor gardening and provide actual experience for the students in maintaining, developing and managing them.

In the Garden are two extensive ranges of greenhouses, one of which is the largest glasshouse in America. There is also a range of propagating houses with ground adjacent for experimental and practice gardens. Also within Bronx Park are the extensive glasshouses of the Park Department, in which students may observe the propagation of plants on a large scale. With these unrivalled facilities, the students in gardening have the best possible opportunity to learn by actual practice all details of greenhouse work. There students may become familiar with many thousand different kinds of plants and their cultivation.

The Botanical Garden also has at the disposal of the students an extensive library of horticultural books and laboratories and equipment for class work indoors.

METHODS OF INSTRUCTION

The instruction is given by the staff of the Botanical Garden and officers of other institutions, insuring that the students will be at all times under the direction of highly trained specialists. The work is of three kinds. Under the supervision of the Head Gardener and his foremen, the students spend about one half of their time in actual practical work, including the subjects outlined in the curriculum. On one or two days each week members of the Garden staff or other specialists present lectures or demonstrations on subjects of interest to gardeners and on which all gardeners should be informed. The remainder of the time is spent in class work, and the students learn from lectures and laboratory study the fundamental principles of the sciences upon which successful gardening is based. Students who complete the course not only know what to do and how to do it, but they also understand the reason for all garden operations. In other words, they are not garden laborers, but trained gardeners.



The Mansion, used as a School-house for Gardening Instruction

ATTENDANCE

Required attendance is from 9:30 A.M. to 4:00 P.M., Mondays, Tuesdays, Wednesdays, Thursdays and Fridays, except holidays, with an interval from 12:30 to 2 o'clock between morning and afternoon sessions. Students will obey all orders of Mr. Kenneth R. Boynton, marshal of the Garden School, and of the other instructors. The main library in the Museum Building and the special library in the Mansion are available for students' reading during the noon intermission, on afternoons after exercises, and on Saturdays, Sundays and holidays. During stormy days on which outdoor work has been planned, instruction will be given in the greenhouses, laboratories, lecture rooms or museums.

Students will be admitted at any time and will take up the course of instruction where it is progressing at the time of their entrance.

CURRICULUM

[Subject to modification in details.]

1. *Winter Quarter, ending April 11*

Greenhouse Practice—Two days (Foreman Becker).

Elementary Botany—Three mornings (Dr. Stout).

Garden Botany—One afternoon (Mr. Nash and Mr. Boynton).

Special Lectures or Demonstrations—Two afternoons.

2. *Spring Quarter, April 14–June 27*

Vegetable and Fruit Gardening—Two mornings (Foreman Finley).

Flower Gardening—Two mornings (Mr. Boynton).

Greenhouse Practice—One morning (Foreman Becker).

Garden Botany—Two afternoons (Mr. Nash and Mr. Boynton).

Garden Zoölogy—One afternoon (Dr. Southwick).

Garden Carpentry—One afternoon (Mr. Corbett).

Special Lectures or Demonstrations—One afternoon.

3. *Summer Quarter, July 7–September 26*

Vegetable and Fruit Gardening—Two mornings (Foreman Finley).

Flower Gardening—Two mornings (Mr. Boynton).

Plant Physiology—One morning (Dr. Stout).

Garden Botany—Two afternoons (Mr. Nash and Mr. Boynton).
 Garden Zoölogy—One afternoon (Dr. Southwick).
 Special Lectures or Demonstrations—Two afternoons.

4. *Autumn Quarter, October 6–December 19*

Elementary Botany—Two mornings (Dr. Stout).
 Plant Chemistry—One morning (———).
 Vegetable, Fruit and Flower Gardening—One morning (Mr. Boynton and Foreman Finley).
 Greenhouse Practice—One morning (Foreman Becker).
 Soils—One afternoon (———).
 Garden Botany—Two afternoons (Mr. Nash and Mr. Boynton).
 Garden Zoölogy—One afternoon (Dr. Southwick).
 Special Lectures or Demonstrations—One afternoon.

LECTURES AND DEMONSTRATIONS

Special lectures and demonstrations on one or two afternoons each week in the above schedule of attendance will include nursery and cold-frame practice; care of trees and lawns; mulching; laying out and construction of paths; care of manure and of leaf-mould; fertilizers; drainage; forestry; native wild plants; tropical gardening; tropical botany; old world gardens; uses of plant products; bacteriology; bee-keeping; husbandry; canning and preserving; winter care of vegetables; construction and care of green-houses; and other subjects.

The schedule for the second year's course (1920) will be announced subsequently. In addition to a continuation and elaboration of subjects covered in 1919, it is planned to include surveying, garden design, garden pathology and garden mycology.

CERTIFICATE

A certificate will be issued to students who satisfactorily complete a two-years' course.

All communications should be addressed

THE NEW YORK BOTANICAL GARDEN,
 BRONX PARK,
 NEW YORK CITY

TREES AND CHILDREN

Among the beautiful beeches in the Forest of Fontainebleau, in France, stands one sacred to King Louis IX, called the Tree of Saint Louis. Because of the virtue and piety of this king, the tree of Saint Louis was afterwards chosen as a place for worship, somewhat after the custom of the druids, who worshiped under the oak, and the fire-worshippers, who prayed beneath the plane-tree in the plains of Persia. After the French revolution, such homage to royalty was forbidden, but the peasants of the neighborhood continued to come by night and hang their wreaths and woven beads on the sacred tree.

I believe that children might be taught to reverence to some extent every tree for its beauty and usefulness, as nobles and peasants revered the Tree of Saint Louis.

The children of the Orient have the bamboo, the ginkgo, the teak, the banyan, and the oriental plane; those of Syria the ancient olive trees and cedars of Lebanon. The children of Norway have the Norway maple, and the Norway spruce; those of Sweden, who live in the very home of Christmas, have also beautiful firs and birches. The Germans love their lindens and horsechestnuts and fill their fairy stories with references to fir trees; the Swiss children spend their summers on the Alpine pastures surrounded by tall and stately firs and spruces; the Austrian children find the larch on the mountains and a beautiful species of pine in some of the valleys, from the wood of which they carve their Christmas toys; the Italian children, even in the crowded streets of Venice and Naples, cannot fail to know something of the chestnut and olive orchards on the mountain slopes and the pollarded willows of the lowlands. The children of rural France love the long rows of poplars that shade the highways, and those of the cities love their beautiful parks and shaded boulevards; the London lad occasionally turns his eyes from his cricket bat to gaze upon a majestic field elm or a grove of oaks or beeches, while the farmer's boy loves to linger in the shade of the elms and oaks that everywhere dot the English landscape.

In Cuba, children play beneath wide-spreading laurel trees and

which Cortez reviewed his shattered army. The children of California boast of the giant redwoods, still the largest of all trees in spite of rival claims; while those of Washington and Oregon know red firs and other trees almost as large. The boy of the southern United States delights in the magnificent oak, chestnut, and pine forests, and in the beauty and perfume of the southern magnolia; while the boy of the North glories in "the murmuring pines and the hemlocks" and the valuable forests of maple, beech, and birch.

Children are exceedingly active both in body and brain. It is difficult to injure them physically or mentally if the conditions are favorable for their activity. Natural history studies are peculiarly adapted to the development of both the mind and body of the child. A great deal more might be taught them than is now generally attempted, which would advance them mentally and improve them morally, especially in so far as their life-long happiness is concerned.

The interests of the man and woman are largely predetermined by the interests of the boy and girl. It often happens that without making an effort to increase one's knowledge by special study, this knowledge accumulates on account of having been favorably impressed with a subject at an early age. Public men often act upon public questions on the basis of information and training gained in childhood. No one yet knows how deeply the character and actions of men are influenced by impressions received when very young.

Both with children and adults, there are always things to do and things not to do.—In the matter of shade-trees, parks, state forests, national forests, there are things to do and things not to do. If an early start were made with the child to instil the idea of conservation, or non-destruction, and to inculcate the royal palms; while in Mexico, girls and women loiter and wash their clothes beneath the willows that fringe the streams or gather wild fruits and flowers under oaks and Montezuma pines. Every child in Mexico City knows the grove of giant cypress trees adjoining Chapultepec and "La Noche Triste" tree, under

proper economic attitude toward our parks and forests, many vexing questions would largely settle themselves, the law of use without abuse appealing naturally to all fair-minded and properly instructed people.

Trees are especially adapted to child study. They are prominent, useful, abundant, beautiful, and varied, individually and collectively, throughout every season of the year. In summer, they shelter us from the sun; in winter, they shed their leaves and let the sunshine in. When other natural objects are dead or dormant or covered with snow, trees still afford most attractive objects of study. In the springtime, they put forth their leaves, which serve as beautiful and characteristic "visiting cards," and make their appeal for recognition and remembrance not only during the luxuriant growth of summer but also when the colors have been touched and glorified by autumn. The leaves are easily collected and preserved and may be used for identification until more and better characters are discovered and studied. Children may also be made to realize that they can assist in protecting trees and in destroying many of the insect pests that are usually so abundant about cities and towns.

In studying history, art, literature, mythology, and the customs of various peoples, a child finds many references to trees and tree-lore. If we add to these sentiments and fancies some definite and accurate knowledge of the more common trees in one's locality, together with the life-history and needs of trees in general, it means a much broader and happier life for the child and man. Trees will then never be forgotten, but will be recognized and loved as the faces of friends; and, when life draws near to its close, one may come to realize that a marble tomb and eternal sleep for the body's dust is not to be compared with a grave in the forest beneath some noble tree, where life and activity and beauty may be repeated through the cycles for the benefit of every flower that blooms in its shade, every bird that sings in its branches, and every human being who loves to walk and muse in the forest solitudes.

W. A. MURRILL

A GENUS OF PLANTS INTERMEDIATE BETWEEN *PETALOSTEMON* AND *PAROSELA*

In a part of the North American Flora now going through the press, there appears an unpublished generic name in the key. As the tribe to which it belongs is too large to be treated in a single part of said publication, and the description belonging to the generic name will follow in the subsequent part, which will not be published for a few months, it is necessary to publish the following technical notes and description in advance.

Linnaeus in the first edition of his *Genera Plantarum* (1737) proposed a genus *Dalea*, but merged it later into *Psoralea* and it appeared as *Psoralea Dalea* in his *Species Plantarum* (1753). A. L. Jussieu resurrected the Linnaean genus in 1789, but in the meantime the same name had been used by several botanists for other genera, so that *Dalea* (L.) Juss. can not be maintained. Lately the name *Parosela* Cavanilles has been taken up for what was known as *Dalea* (L.) Juss.

Michaux mistook a plant of the eastern United States for *Psoralea Dalea* L., which was from Vera Cruz, Mexico. As double binomials were not in vogue then, he proposed the name *Dalea Linnaei* in 1803. Willdenow, in the same year (apparently a little earlier) described the United States plant as *Dalea alopecuroides*, under which name it has usually been known, and proposed the name *D. Clifortiana* for the Vera Cruz plant. The latter name has passed into oblivion. De Candolle, evidently without thoroughly investigating the matter, united the two species. Following him, MacMillan, in 1892, proposed the combination *Dalea Dalea*, and Britton, in 1894, that of *Parosela Dalea*. Both applied it to the United States plant.

Ventinat, in 1799, and Willdenow, in 1803, included in *Dalea* not only what has usually been known under that name, viz., the species of *Parosela* Cav., but also the known species of *Petalostemon* Michx. and *Kuhnistera* Lam. Most authors have united the latter two genera, but kept *Dalea* distinct. The characters used to distinguish *Dalea* and *Petalostemon* from each other are given in the New Gray's Manual, page 501, in the best condensed form I know of, as follows:

"**Dalea.** Corolla imperfectly papilionaceous. Stamens 9 or 10; the cleft tube of filaments bearing 4 of the petals about its middle.

"**Petalostemon.** Corolla scarcely at all papilionaceous. Stamens 5; the cleft tube of filaments bearing 4 of the petals on its summit."

The United States plant mentioned above, *Dalea alopecuroides* Willd., falls distinctly under *Dalea* as here characterized, and so do all the species included by Cavanilles in the original diagnosis of *Parosela*; but the Vera Cruz plant, *Psoralea Dalea* L., the plant on which the genus *Dalea* (L.) Juss. was based, does not. Turning to plate 22 in Hortus Cliffortianus, which was drawn from a cultivated plant from Mexican seeds, known to Linnaeus, afterwards raised in his own garden, and cited in his Species Plantarum, it may be seen that it represents not *Dalea alopecuroides* Willd. but *D. nigra* Mart. & Gal. of Mexico. The latter has 10 stamens, but the corolla is not at all papilionaceous and 4 of the petals are inserted at the end of the staminal tube; they are wholly distinct, short-clawed, and only slightly oblique, just as in *Petalostemon*. In *Parosela* the wings and keel-petals are inserted lower or higher up on the staminal tube, but not at the end thereof, the keel-petals slightly higher up than the wings. The blades of both are distinctly clawed, very oblique, with a basal lobe on the upper side, and the keel-petals are usually more or less united along the lower edge near the tip.

In other words, *Parosela Dalea* L. combines certain characters of the genera *Petalostemon* Michx. and *Parosela* Cav. (*Dalea* as understood by De Candolle, Bentham and Hooker, and American authors generally). This species is, however, not the only one with the characters mentioned. There is a distinct group of plants, although not very large, of the southwestern United States and Mexico, which agree in these respects. In habit and structure of the flowers, they are almost identical with typical *Petalostemon*, except that the stamens are 9 or 10, instead of 5.

There are three ways in which the difficulty could be solved:

1. By uniting *Petalostemon* and *Parosela* into one genus, which few botanists would be willing to do.

2. By transferring these species from *Parosela* or *Dalea* to *Petalostemon*, which would meet with perhaps as little favor, as the latter genus has always been known by its 5 stamens.

3. By proposing a new genus to include these species, as *Dalea* is not an available name. I have chosen the last method.

As nearly all the species differ from *Psoralea Dalea* L. (*Dalea nigra* Mart. & Gal.) in being perennials and closely resembling each other in habit, it seems better to select the type of the new genus from among these rather than to assign *Psoralea Dalea* L. as such.

The type selected, *Dalea albiflora* A. Gray, and several of its closer relatives are found in Arizona, New Mexico, and northern Mexico. I therefore think it fitting to associate these plants with a student who has done much botanical work in this region and take pleasure in naming the genus in honor of Professor John James Thornber of the University of Arizona.

Thornbera Rydberg, gen. nov.

Perennial or annual herbs, related to *Petalostemon* and *Parosela*. Flowers in usually dense spikes. Calyx campanulate, 10-ribbed, 5-lobed. Petals all distinct; banner inserted on the hypanthium in the bottom of the calyx, with a cordate or ovate blade and a long claw; wings and keel-petals similar to each other, subsessile or short-clawed, inserted at the mouth of the staminal tube, the blades oval or obovate, slightly oblique but not lobed at the base. Stamens 10 or 9, monadelphous, the upper portion of the filaments free. Fruit indehiscent, 1-seeded.

Type species, **Thornbera albiflora** (A. Gray) Rydberg. *Dalea albiflora* A. Gray, Pl. Wright. 2: 38. 1853.

P. A. RYDBERG

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

ANACARDIACEAE. Sumac Family

Cotinus. SMOKE-TREE

Cotinus americanus. AMERICAN SMOKE-TREE.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Cotinus Cctinus. EUROPEAN SMOKE-TREE.

Location: Fruticetum.

Natural distribution: Europe and Central Asia.

Rhus. SUMAC

Rhus copallina. MOUNTAIN SUMAC.

Location: Fruticetum.

Natural distribution: Eastern United States.

Rhus glabra. SMOOTH SUMAC.

Location: Fruticetum. Wild, common.

Natural distribution: Eastern North America.

Rhus hirta. STAGHORN SUMAC.

Location: Fruticetum.

Natural distribution: Eastern North America.

Rhus hirta var. **dissecta.** PLUMED STAGHORN SUMAC.

Location: Fruticetum. West border, across road from upper lake.

Rhus javanica. OSBECK'S SUMAC.

Location: Fruticetum.

Natural distribution: China.

Rhus Michauxii. DWARF SUMAC.

Location: Fruticetum.

Natural distribution: North Carolina to Georgia.

Rhus Potaninii. CHINESE SUMAC.

Location: Fruticetum.

Natural distribution: Central and western China

Schmaltzia. SCENTED SUMAC**Schmaltzia crenata** (*Rhus aromatica*). FRAGRANT SUMAC.

Location: Fruticetum.

Natural distribution: Eastern United States and Ontario.

Toxicodendron. POISON SUMAC**Toxicodendron radicans.** POISON IVY.

Location: Wild, common.

Natural distribution: North America.

Toxicodendron verniciflua. LACQUER TREE.

Location: Arboretum.

Natural distribution: Japan, China and the Himalayas.

AQUIFOLIACEAE. Holly Family.

Ilex. HOLLY**Ilex bronxensis.** NORTHERN WINTERBERRY.

Location: Fruticetum.

Natural distribution: Northeastern United States.

Ilex crenata. JAPANESE HOLLY.

Location: Fruticetum. Conservatory beds. Mansion.

Natural distribution: Japan.

Ilex crenata var. **microphylla.** SMALL-LEAVED JAPANESE HOLLY.

Location: Fruticetum.

Ilex decidua. SWAMP HOLLY.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Ilex glabra. INKBERRY.

Location: Fruticetum.

Natural distribution: Eastern United States.

Ilex montana (*Ilex monticola*). LARGE-LEAVED HOLLY.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Ilex opaca. AMERICAN HOLLY.

Location: Fruticetum.

Natural distribution: Eastern United States.

Ilex serrata. SIEBOLD'S HOLLY.

Location: Fruticetum.

Natural distribution: Japan.

Ilex serrata var. **argutidens.** SHARP-TOOTHED JAPANESE HOLLY.*

Location: Fruticetum.

Ilex verticillata. VIRGINIA WINTERBERRY.

Location: Fruticetum.

Natural distribution: Eastern United States.

Nemopanthus. WILD HOLLY**Nemopanthus mucronata.** WILD HOLLY.

Location: Fruticetum.

Natural distribution: Northeastern North America.

CELASTRACEAE. Staff-tree Family

Euonymus. STAFF-TREE**Euonymus alatus.** WINGED SPINDLE-TREE.

Location: Fruticetum. Conservatory beds.

Natural distribution: China and Japan.

Euonymus alatus var. **subtriflorus.** SMALL-FRUITED WINGED SPINDLE-TREE.

Location: Fruticetum.

Euonymus atropurpureus. BURNING BUSH.

Location: Fruticetum.

Natural distribution: Eastern North America.

Euonymus Bungeanus. BUNGE'S SPINDLE-TREE.

Location: Fruticetum.

Natural distribution: China and Manchuria.

Euonymus Bungeanus var. **semipersistens.** BUNGE'S ROSE-FRUITED SPINDLE-TREE.

Location: Fruticetum.

Euonymus europaeus. SPINDLE-TREE.

Location: Fruticetum.

Natural distribution: Europe to eastern Asia.

Euonymus europaeus var. **variegatus.** VARIEGATED SPINDLE-TREE.

Location: Fruticetum.

Euonymus Maackii. MAACK'S SPINDLE-TREE.

Location: Fruticetum.

Natural distribution: Northeastern Asia.

Euonymus nanus. DWARF WEEPING EUONYMUS.

Location: Fruticetum.

Natural distribution: Western Asia to western China.

Euonymus obovatus. RUNNING STRAWBERRY BUSH.

Location: American Wood Garden.

Distribution: Northeastern United States.

Euonymus patens. SPREADING SPINDLE-TREE.

Location: Fruticetum.

Natural distribution: Central China.

Euonymus radicans. CREEPING JAPANESE EUONYMUS.

Location: Fruticetum.

Natural distribution: Northern and central Japan.

Euonymus radicans var. **acutus.** ACUTE CREEPING EUONYMUS.

Location: Fruticetum.

Euonymus radicans var. **Carrierei.** CARRIERE'S CREEPING EUONYMUS.

Location: Fruticetum.

Euonymus radicans var. **variegatus.** VARIEGATED CREEPING EUONYMUS.

Location: Fruticetum.

Euonymus radicans var. **vegetus.** BROAD-LEAVED CREEPING EUONYMUS.

Location: Fruticetum.

Celastrus. SHRUBBY BITTER-SWEET**Celastrus articulatus.** JAPANESE SHRUBBY BITTER-SWEET.

Location: Viticetum.

Natural distribution: Japan and China.

Celastrus articulatus var. **punctatus.** SMALL-LEAVED JAPANESE SHRUBBY BITTER-SWEET.

Location: Viticetum.

Celastrus scandens. SHRUBBY BITTER-SWEET.

Location: Wild, common.

Natural distribution: Eastern United States and Quebec.

SPRING LECTURES, 1919.

Apr. 5. "The Advent of Spring," by Dr. N. L. Britton.

Apr. 12. "Scenic Features of North American Mountains,"
by Mr. LeRoy Jeffers.

Apr. 19. "The Place of Trees in Men's Affairs," by Mr.
Carl Bannwart.

Apr. 26. "Some Interesting Tropical Trees," by Dr. W. A.
Murrill.

May 3. "Evergreens," by Mr. G. V. Nash.

May 10. "Plant Hybrids: How Produced: Their Uses," by
Dr. A. B. Stout.

(Exhibition of Flowers, May 10 and 11.)

May 17. "The Future of American Forestry," by Professor
J. W. Toumey.

May 24. "The Recognition of Medicinal and Poisonous
Properties in Unknown Plants," by Dr. H. H. Rusby.

May 31. "Floral and Scenic Features of the Panama Canal
Zone," by Dr. M. A. Howe.

June 7. "The Botanical Garden at Buitenzorg, Java," by
Dr. H. A. Gleason.

(Exhibition of Roses and Peonies, June 7 and 8.)

June 14. "Destructive Insects," by Dr. F. J. Seaver.

NOTES, NEWS, AND COMMENT

Dr. John H. Barnhart, bibliographer, spent a few days in
Washington and Philadelphia during the first week in February,
engaged in bibliographic work.

Hon. Francis D. Gallatin has been appointed President of the
Board of Park Commissioners for the city of New York, and be-
comes thereby a member of the Board of Managers of the Garden.

Corporal Kenneth R. Boynton, head gardener's assistant and formerly editor of the JOURNAL at the New York Botanical Garden, has been honorably discharged from the United States Army and has resumed his work at the Garden as Marshal of the Garden School.

Mr. J. B. Norton, of Washington, paid a brief visit to the Garden in February to examine the herbarium specimens of *Smilax*. Mr. Norton expects to leave soon for China, in connection with the Office of Seed and Plant Introduction.

Dr. John K. Small, head curator, spent ten days during February on a collecting trip in the southeastern states. He visited several coastal points as far south as Charleston, South Carolina, and returned with some valuable material, chiefly specimens of cacti.

The following botanists have registered in the library during the winter: Herbert W. Faulkner, Washington, Conn.; Mrs. Nellie F. Flynn, Burlington, Vt.; Dr. Forrest Shreve, Tucson, Ariz.; Professor W. W. Rowlee, Ithaca, N. Y.; Miss Caroline C. Haynes, Highlands, N. J.; Professor Alexander W. Evans, New Haven, Conn.; Professor C. P. Smith, College Park, Md.; Miss Ellen Miller, and Miss Margaret C. Whiting, Deerfield, Mass.

Miss Margaret C. Whitney and Miss Ellen Miller, of Deerfield, Massachusetts, joint authors of the "Wild Flowers of the New England States," visited the Garden on February 11 in company with Miss Alice Donlevy. They have established an Arts and Crafts shop in their native town and conducted a series of experiments in dyeing with vegetable dyes on plant fabrics, particularly homespun linen, using many of our native plants, including butternut, sumac, osage orange, red maple, and oak galls, and also such imported dyes as indigo, madder, logwood, fustic and cutch (*Acacia catechu*).

At the conservatories, in house no. 4, the large plant of *Medinilla magnifica* is now in full bloom and strikingly beautiful. This species is one of the most showy members of the meadow-beauty family, Melastomaceae, and this is an unusually large specimen for greenhouse cultivation. Its numerous pendulous flower clusters, of a bright rose pink, make it a conspicuous object in that house. In the aquatic house, no. 9, is a plant in full flower of the Florida swamp-lily, *Crinum americanum*. This is the only species of the genus native to the southeastern United States, and inhabits shaded river swamps or open marshes from Florida to Texas; it is also found in some parts of Cuba and the Isle of Pines. Another plant of interest in this house is the Egyptian paper plant, *Cyperus Papyrus*, with its tassel-like inflorescences at the ends of the tall slender stems.

In the fruticetum the Asiatic hazelnut, *Corylus pontica*, has already passed flowering, having first opened its catkins late in January. Thunberg's willow, *Salix gracilistyla*, is covered with "pussies," which almost any warm day now may break into bloom; it is one of the earliest to show signs of activity, accommodates itself to either dry or wet situations, and is one of the best of the shrubby willows. The goat willow, *Salix caprea*, is also in "pussies," and the first warm days will bring it into bloom. The Japanese Mahonia, *Odostemon japonicus*, has its flowers in the bud stage and will be in bloom ere long. Perhaps the most attractive plant in the fruticetum has been the Japanese witch-hazel, *Hamamelis japonica*. Covered with its mantle of bright yellow flowers, it offers a striking contrast with its neighbors, still in their dormant condition of naked branch and limb; attractive as it is in itself, it is doubly so coming at a time when most other shrubs and trees give no sign of an early awakening.

In the flower gardens the snowdrops have been bold in their efforts to tell us that spring is coming; they are very optimistic, for their first flowers appeared late in January, and have appeared scatteringly ever since. The Cloth-of-Gold crocus came into full flower during the second week of March.

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OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

First Assistant

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Exhibition of Plant Forms Used in Ornament

JOURNAL

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THE EXHIBITION OF PLANT FORMS USED IN DESIGN

(WITH PLATES 230 AND 231)

As announced in the JOURNAL for February and also by cards mailed to all members, a joint exhibition of plants and of art objects decorated with plant forms was installed in Class-room B at the Metropolitan Museum of Art and was available for public examination and instruction from March 15 to April 21, 1919. The exhibition was largely attended, many classes of students as well as individuals taking advantage of the opportunity, and the display elicited much favorable comment on its beauty and on its educational value.

The exhibition was the natural development from a similar, but much smaller, one given at the Mansion, New York Botanical Garden, last October, when Mrs. Britton, assisted by Miss Alice Donlevy and Dr. E. B. Southwick, showed a small loan collection of art objects and illustrated them by living specimens of the plants which were used in their decoration. At that time Miss Alice Donlevy made a plea for less copying of old designs and Mrs. Britton for the use of native plants in ornament. Mr. Richard T. Bach, of the Metropolitan Museum, also spoke to art students from the Cooper Institute who were present.*

The installation and description of the botanical part of the exhibition were referred to Dr. W. A. Murrill, Supervisor of Public Instruction at the Garden, who was aided by other employees and members. Dr. Murrill was in attendance throughout

* Journal of the New York Botanical Garden 19: 299.

the exhibition for explanation and instruction, and the quotations which follow are chosen from his remarks. The selection of art objects was referred to Mr. Bach, and they were arranged and grouped by Mrs. Vaughan, Miss Abbot and Miss Morris. The representatives of the two institutions worked coöperatively and enthusiastically and are largely responsible for the success of the exhibition.

The room used is nearly forty feet square, with a window on the south end and one on the east facing the entrance. Museum cases were arranged about the walls and in the center of the room, while the remaining wall space was covered with textiles and the floor space with screens and living plants.

The bright and eager faces of art students as they began a closer inspection of the exhibit would have been an inspiration to a teacher of any subject; but with such a theme, involving as it did many centuries of art, literature, religion, and other forms of culture, and reaching back to the earliest artistic efforts of man, one could not fail to do his best.

"By way of introduction, your attention is called to the vertical carved panel and the brilliant drapery on the wall to your right. The motive of the first is lilies, a vase of which stands nearby; and you will notice how these flowers have been arranged in two parallel rows to fit the space. If they had been copied exactly, the result might have been artistic but not an example of decorative design.

"The motive used in the Turkish textile is the ripe fruit of the pineapple, a specimen of which is shown here, together with a young growing plant. The treatment is much broader and more conventional than in the wood-carving, so that you find it difficult to decide at first sight just what the motive was.

"Design is selection and arrangement. Geometric patterns may be used or motives may be adapted from natural objects. Flowers, fruits, and foliage have furnished patterns for decorative design for many centuries."

CASE I

PLANTS: Hyacinth, iris, marigold, pineapple plant and fruit, carnation, red cedar to represent the form of the cypress; pressed specimens of iris; colored figures of iris, opium poppy, pink; photographs of cypress trees; colored figures of oriental poppy and, on the adjacent screen, almond blossoms.

ART OBJECTS: Textile with marigold and iris, textile with morning-glory and pomegranate flowers, Indian pipe case of carved ivory with oriental poppy leaves and flowers, tile with almond blossoms, etc. On the walls adjoining: Textile with sprays of single pink hyacinths, Asia Minor tile with single blue hyacinths and poet's narcissus, textile showing almond tree planted in front of the cypress, and a series of Asia Minor wall tiles of the seventeenth century with the cypress, rose, late tulip, and carnation used as motives.

"After you have sufficiently admired the arrangement and coloring of the iris and marigold flowers in that textile, you should examine rather closely the wall tiles to the left of and above the case. In the little Persian textile just above the cypress photographs, you will see an almond tree represented in flower with a cypress tree as a background. This method of arrangement will be seen later in many forms, sometimes reduced to a mere blue wave or other conventional form with a row of circular patterns along the central axis to represent the almond blossoms.

"The large screen behind us contains a number of pressed specimens and colored figures of plants that have been used in decorative design in Europe and Asia; among them the bryony, almond, snapdragon, olive, oriental plane, aster, sunflower, hepatica, strawberry, foxglove, honeysuckle, oriental and field poppies, iris, violet, peony, and Japanese ivy. Many of them naturally belong in the cases with the art objects, but there is not room for them."

THE SOUTH WINDOW

"The sheaf of grain represents the use of wheat and other cereals in laces, wood-carvings, etc. Sometimes the grains were arranged in symmetrical patterns, as in this piece of lace, but usually the entire heads were used, as in this remarkable piece of drawn-work. Mrs. Robinson told me the other day that she once saw in a house in Richmond, Virginia, some door casings beautifully decorated with designs obtained from stalks of ripe wheat. In one of these lace patterns, you will notice designs resembling wheels. These refer to the custom in vogue in certain parts of Asia where circles of wheat are left uncut, being dedicated to one of the pagan gods who was supposed to bring happiness.

"That French Gothic wood-carving over the case contains three plant motives, the thistle, the grape, and the oak, each represented by foliage and fruit. Specimens of the thistle are attached to the wall adjoining, while grape and oak specimens are to be found elsewhere in the room."

THE ACANTHUS EXHIBIT

PLANTS: The classic acanthus, *Acanthus mollis*, and a wild species from tropical Africa in flower; the artichoke, also used in architecture, and the poet's narcissus.

ART OBJECTS: Capital of Roman Corinthian column in plaster, with a splendid dark-green tapestry on the wall behind it, over which is suspended a melophone; many objects in the museum case showing the acanthus used as a decorative motive in wood-carvings, textiles, silver, steel, bronze, terra cotta, etc. In the Syrian prayer rug covering the back of the case the pomegranate is the principal motive.

"The acanthus is the plant beloved by architects. Two species grew wild in southern Europe, *Acanthus mollis* and *Acanthus spinosus*, both used on account of their wonderful foliage. This is beautifully shown in the seventeenth-century Italian tapestry behind the Roman capital and in the handsome breastplate of embossed steel by Negroli, of Milan. As you walk through the halls of this building or along the streets, you will recognize the acanthus as a fundamental motive. Look through the window at the two main columns of this building, which are surmounted with capitals of this order. Callimachus, the inventor of the Corinthian capital, is said to have obtained the idea from a tile-covered basket placed over a tomb, about which the leaves of an acanthus plant had grown in profusion."

THE LOTUS EXHIBIT

PLANTS: Herbarium specimens and fruits of the American lotus, which is practically identical with the oriental species in form, and a colored figure of a water-lily to show the structure of the flower; several water-lilies in vases.

ART OBJECTS: Chinese silk with foliage and flowers of lotus and chrysanthemum treated naturalistically, but with medallions conventionally arranged; handles of a bronze vase showing unopened lotus flowers; a Japanese bronze of the last century showing the entire lotus plant with foliage, flower, and fruit; vases, pottery, brasses, and other objects using the lotus as a motive.

"The lotus is one of the oldest, as well as one of the most beautiful, plant motives ever used. It grows in the valley of the

Nile, and was used by the Egyptians, together with the papyrus and palm, in all forms of decorative art. It is now considered the origin of the well-known 'palmette,' or 'honeysuckle,' design. In the statue of Iny and Rennut, upstairs, you will remember that Rennut's long curled wig is bound about her forehead with a band of lotus flowers. There were two species of 'lotus' known to the Egyptians, one with white or pinkish flowers (*Nelumbo*) and the other with blue flowers. The latter, *Castalia coerulea*, is shown near the center of the famous stela of Menthu-weser in one of the Egyptian rooms.

"The true lotus must not be confused with the plant referred to in Tennyson's poem about the 'mild-eyed lotus-eaters.' That was the jujube, a prickly shrub bearing fruits resembling a plum or date and much used as a dessert. The United States Department of Agriculture has recently introduced it from the Orient into many southern parts of this country. Homer describes Ulysses as arriving at the coast of Libya, where many of his sailors ate the jujube fruits and lost their desire to return to home and friends.

"Passing by this Chinese textile, in which the poet's narcissus is too naturalistically treated, and the old Persian hanging beautifully decorated with pomegranate flowers, we come to Case 3, showing the use of the grape as a motive."

THE GRAPE EXHIBIT

PLANTS: Herbarium specimens of grape foliage and a bunch of grapes.

ART OBJECTS: Wood-carvings, textiles, ivory, metal, tile, pottery, and plaster, showing the grape used as a motive.

"Just as the lotus was a sacred plant in the Orient, the emblem of the Buddhist religion; so the grape, when freed from its connection with Bacchus and his pagan rites, became the emblem of the Christian religion. Christ said, 'I am the vine; ye are the branches.' Notice the rhythm and the artistic arrangement of this Coptic textile, and in this wood-carving, where the heads of wheat and the clusters of ripe grapes signify the bread and wine of the communion service.

"In Persian legendary lore the cypress tree was emblematic of

eternal life and the almond tree of love, and the Persian textile near Case 1 shows cypress trees with almond trees planted in front of them. What may be called the 'cypress-almond' motive may sometimes be much reduced and obscure, but it is present in most of Persian decorative art and in that of Asia Minor as well, although the latter also shows Turkish influence. The two Asia Minor brocades on the wall in the corner both illustrate this motive. In the first, where late tulips are conspicuously employed, the alternating clusters of leaves in twos and threes are designed from the cypress tree with a row of almond blossoms along the central axis. In the second, the principal design is a palmette derived from the carnation flower, while the cypress-almond motive appears in the two narrow leaves just below the flower."

ORIENTAL RUGS

"It may be of interest to you at this point to say a word or two about oriental rugs, a number of which are in exhibit in this room. The rugs of the Orient were pictures, and usually associated with religious motives. Those of the Caucasus were cold in color and full of geometric designs; Indian rugs show exact copies of foliage and flowers; Persian rugs are possibly the best examples of floral patterns used as motives only; while Chinese rugs contain both floral and geometric motives with various mystic symbols, many of them being unequaled in beauty and priceless in value. The key to the Turkish rug is the 'prayer niche,' which pointed toward Mecca. The space in the niche was usually blue, which, according to Persian ideas, signified 'sincere silence.'

"You noticed that the Persian hanging which we passed a short time ago was very thin and contained no knots. This was true of all the early rugs, the knots being added to give thickness and body to them used on cold or damp ground. Only two kinds of knots—really loops—were employed in oriental rugs. The number of knots to the square inch determined the compactness of the fabric and the direction of the pile had a marked influence on its color."



Exhibition of Plant Forms Used in Ornament

THE GARDEN CARPET

"This large rug on the wall is Persian, of the seventeenth century. A king who loved his garden had a design made of it in jewels so that he might look upon it during the winter when the snow covered the ground; and this design was later used in rugs. You will notice a central pool, from which brooks flow in four directions with flowers planted on their banks and in large beds alternating with the oriental planes about the pool, under which the king sat with his wise men and poets while the singing birds in the branches overhead told him the secrets of the universe. A larger brook in the center is bordered with two rows of cypress trees with flowers between them."

CASE 5

PLANTS: Marigold, lily, crocus, tulip, fern. The Fuchs Herbal, a book which has had an immense influence on decorative art.

ART OBJECTS: Framed tile with marigolds; Minoan jar and votive vestment with lavender or blue crocuses; Minoan vase and a dagger with lilies; textiles and other objects.

"This case contains a number of beautiful objects. Nothing could be prettier than the use of the dainty crocus motive by the Cretans on jars and votive costumes and by the Copts on some of their wonderful textiles. This Minoan terra-cotta jar shows the 'spirit' of the lily to the very best advantage. The flower is not copied, but its outline and rhythm are adapted in a very pleasing way to the shape of the jar. Its use on the dagger blade seems rather strained, since the lily is an emblem of purity. The marigolds on the tile are quite naturalistically treated, but combined to some extent with a conventional pomegranate motive."

CASE 6

PLANTS: Pomegranate flowers and foliage pressed and in colored figures, pomegranate fruit; peony plant and colored figures of tree-peony and the ordinary species.

ART OBJECTS: Chinese wooden pillow of the Sung dynasty ornamented with tree peonies; Russian silver-gilt plate, gold chalice, Flemish bobbin lace, Asia Minor embroidery, Venetian velvet brocade, etc., using pomegranate flowers and fruits as motives. On the wall, a handsome strip of Spanish brocade with the same motive.

"The Chinese used the peony a great deal, as is well illustrated by that handsome wooden pillow; but the chief motive exhibited in this case is the pomegranate. This tree is a native of Persia, and its shapely and brilliantly colored flowers and fruits early attracted the decorative artist. The fruit was reproduced in ancient Egyptian and Assyrian sculpture, as for example in the relief from a memorial temple of Rameses I at Abydos, where it is associated with grapes and other fruits. The so-called 'pear motive' is a pomegranate fruit elongated in shape. The seeds were symbolic of eternal life. In the chalice, two plant motives were used, the top representing a cluster of foxglove flowers and leaves. What could be finer than that strip of Spanish brocade with its rich colors and superb pomegranate designs!"

CASE 7

PLANTS: Two growing plants of English ivy and a vase of Ophelia roses.

ART OBJECTS: Chinese plate with wild roses, Asia Minor bowl with rose and cypress-almond motives, sepulchral vase of the third century B. C. with ivy ornamentation, and many others.

"Here again, in this wonderful bowl, we find the cypress-almond motive alternating with the peculiar rose which you have learned by this time to associate with Asia Minor and Persian designs. The buds and leaves of the rose are quite naturalistically treated.

"In this plate, one of the very finest pieces in the collection, the cypress and almond trees are kept distinct. This interesting sampler, with its puritanical maxim, would be more artistic if the rosebuds in the border were not quite so large. In the Coptic textile over the case, the rose is reduced to four petals—a very easy thing for the decorative artist to do—as is seen in some French designs. The motive used in the prayer rug near the door is said by some to be the rose, by others to be the pomegranate."

THE CENTRAL CASES

PLANTS: Marguerite, English daisy, papyrus, living leaves of the true laurel; edelweiss, acorns, oak leaves, and, on the screen, olive leaves and flowers.

ART OBJECTS: Greek vases with laurel, olive, and palmette designs; Minoan jug and ornaments with daisies; laces with rose, lily, forget-me-not, pomegranate, carnation, sunflower, anemone, edelweiss, oak, daisy, and cherry designs; various other objects.

"Note the beauty of form and color in the daisy design on this Minoan jug, over three thousand years old, and compare it with the flowers on this marguerite plant. The olive was the symbol of plenty and the laurel signified success or victory. By comparing the true laurel leaves of southern Europe with those of our mountain laurel, you will notice some differences, but these were not sufficient to prevent the use of tons of the latter in welcoming our returning victorious troops.

"The remarkable hanging over the door is not tapestry, but embroidery, and the woman who made it must have spent a lifetime. It is a seventeenth-century Italian altar front representing a formal garden, the pots of tulips and the angels with golden harps being made separately and stitched on. Notice the excellent perspective and well-preserved colors. Careful scrutiny will reveal many different kinds of trees, flowers, birds, and other objects used as motives in this truly wonderful piece of work.

"One of the most interesting and graceful plants in the room is the papyrus. It was probably introduced into Egypt from Nubia and became so abundant and important there that it was chosen as the emblem of Lower Egypt, as the lily was the floral emblem of Upper Egypt. When these two districts became united under Menes, the first historical king of Egypt, the floral emblems were blended, as was done with the red and white roses in England.

"The uses of the papyrus, now unfortunately extinct in the valley of the Lower Nile, were many and varied; the large, strong roots, as well as the slender leafstalks, replacing wood for many purposes, while the pith was eaten and the branching leaf-tops were made into garlands for the shrines of the gods. But its most important use was in the manufacture of paper.* The stalks were cut into thin strips and laid side by side on a board, with another layer of strips across them, and then soaked in river water until somewhat mucilaginous, when they were pressed and smoothed into sheets of paper, the finest of which were called *hieratica*. Here is one of these sheets, covered with ancient hieratic characters.

"The papyrus was used by the Egyptians in design along with the lotus and palm, it being especially adapted to the shafts and capitals of columns. One of the most beautiful columns in the Museum is in the Egyptian section, upstairs, where you will see the papyrus and another related sedge used together to form a composite capital."

"Are those the bulrushes in which little Moses was hidden?" inquired one of the pupils.

"Yes; they are really sedges, their stems being triangular instead of circular in section, but fine distinctions like that do not count in popular language. They were commonly used in the construction of light boats for shallow waters, and they certainly grew tall enough to hide any human being."

PLANTS USED IN DESIGNS EXHIBITED

Acanthus	Marigold
Almond	Morning-glory
Anemone	Narcissus, two kinds
Carnation	Oak, two kinds
Cherry	Olive
Chrysanthemum	Palm
Crocus	Papyrus
Cypress	Passion-flower
Daisy, two kinds	Peony, two kinds
Edelweiss	Pineapple
Fern	Pink
Foxglove	Planetree
Grape	Pomegranate
Hepatica	Poppy, three kinds
Hyacinth	Rose
Iris	Seaweed
Ivy	Sunflower
Laurel	Thistle
Lily	Tulip, two kinds
Lotus, two kinds	Wheat

OTHER PLANTS AND PLANT ILLUSTRATIONS EXHIBITED

A large screen with 140 colored plates from *Addisonia*.

Another screen with 26 sketches of plants arranged in groups; also, on the reverse, 17 mounted specimens of seaweeds selected from the herbarium of the Garden.

A long table containing 28 vases of dried fruits and flowers; also several small living desert plants.

A small formal group of living plants on the floor between the screens, containing specimens of spurges and aloes.

Several tropical American plants of special texture, shape, or color, in various parts of the room, such as cryptanthus, vriesia, and calathea.

Fifty palms, some of large size, arranged in decorative groups about the room and in the corners.

A number of cultivated plants, common to Europe and America, which have furnished motives for design but are not represented by art objects.

A frame of colored illustrations of wild flowers.

A frame of colored illustrations of fungi.

SOME BOOKS ON PLANT FORMS IN ORNAMENT

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GOODYEAR, W. H. The grammar of the lotus. London, 1891.

GRASSET, E. La plante et ses applications ornementales. Paris. 2 vols.

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RANKIN, H. A., & BROWN, F. H. B. Simple art applied to handiwork. Vol. 1. New York.

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AMERICAN PLANTS AS MOTIVES

"One of the chief objects of this exhibit is to direct attention to the wealth of American material available for use in decorative design. The old traditions have a powerful hold, but continued repetition is apt to become monotonous, like playing the same tune, however good it may be, over and over again. The normal human mind is ever demanding something new. Why not look to American plants for new ideas?

"The arbutus, bloodroot, twinflower, orchids, and other wild flowers of great beauty fill our temperate and tropical forests; vines like the smilax, honeysuckle, clematis, and climbing bitter-sweet, trail in profusion everywhere; while shrubs like the mountain laurel, sweet fern, sumac, and button-bush, and trees like the holly, sweet gum, and dogwood, are available to designers in many sections of our country.

"Our waters are also full of ideal patterns for various kinds of decoration, while the strange and infinitely varied forms of fungi that grow on the forest floor and on the trees themselves would yield many novelties to those in search of ideas.

"I would not have you entirely disregard the beautiful plant motives which have served mankind in the past. Nothing endures through the centuries but what is beautiful and good. As reading the best books cultivates our literary taste, so a study of the best styles of decorative art enables us to use intelligently and artistically the new ideas furnished by Nature. The innocent child, or the untutored savage, may discover many things that are novel and wonderful to him, but not essentially different from other primitive efforts. Knowledge is power, in any field, and it is quite necessary to the kind of originality that accomplishes good work.

"Let us, then, infuse new life into the old ideas, and on the old reliable stocks graft and grow new motives peculiar to a New World, where Nature has been very bountiful, as she always is to eyes that can see and hearts that can appreciate her beauties."

The two illustrations accompanying this record are from photographs taken by the photographer of the Metropolitan Museum.

During the exhibition the following public lectures on related subjects were delivered in Class-room A:

April 7. "Spring Flowers," by Dr. N. L. Britton.

April 14. "The Use of Plant Forms in Ornament," by Dr. A. D. F. Hamlin.

April 21. "Collection and Preservation of Seaweed," by Dr. Marshall A. Howe.

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

STAPHYLEACEAE. Bladder-nut Family

Staphylea. BLADDER-NUT

Staphylea Bumalda. JAPANESE BLADDER-NUT.

Location: Fruticetum.

Natural distribution: Japan.

Staphylea colchica. CAUCASIAN BLADDER-NUT.

Location: Fruticetum.

Natural distribution: Caucasus.

Staphylea Coulombieri. COULOMBIER'S BLADDER-NUT.

Location: Fruticetum.

Natural distribution: Caucasus.

Staphylea holocarpa. NAKED BLADDER-NUT.

Location: Fruticetum.

Natural distribution: Central China.

Staphylea pinnata. PINNATE BLADDER-NUT.

Location: Fruticetum.

Natural distribution: Europe to western Asia.

Staphylea trifolia. AMERICAN BLADDER-NUT.

Location: Fruticetum. Wild, common.

Natural distribution: Northeastern North America.

ACERACEAE. Maple Family

Acer. MAPLE

Acer campestre. COMMON EUROPEAN MAPLE.

Location: Arboretum.

Natural distribution: Europe and western Asia.

Acer campestre var. **hebecarpum.** HAIRY-FRUITED EUROPEAN MAPLE.

Location: Arboretum.

Acer cappadocicum var. **rubrum.** RED-VEINED ORIENTAL MAPLE.

Location: Arboretum.

Natural distribution: Caucasus to western China and the
• Himalayas.

Acer circinatum. ROUND-LEAVED MAPLE.

Location: Arboretum.

Natural distribution: Western North America.

Acer Ginnala. GINNALA MAPLE.

Location: Fruticetum.

Natural distribution: Manchuria, northern China, and Japan.

Acer japonicum. HAIRY JAPANESE MAPLE.

Location: Fruticetum.

Natural distribution: Japan.

Acer japonicum var. **aureum.** GOLDEN HAIRY JAPANESE
MAPLE.

Location: Fruticetum.

Acer japonicum var. **macrophyllum.** LARGE-LEAVED HAIRY
JAPANESE MAPLE.

Location: Fruticetum.

Acer japonicum var. **Parsonsii.** PARSONS' HAIRY JAPANESE
MAPLE.

Location: Fruticetum.

Acer leucoderme. WHITE-BARKED SUGAR MAPLE.

Location: Arboretum. Fruticetum.

Natural distribution: North Carolina to Georgia and Louisiana.

Acer macrophyllum. BROAD-LEAVED MAPLE.

Location: Arboretum.

Natural distribution: Southern Alaska to southern California.

Acer Miyabei. MIYABE'S MAPLE.

Location: Arboretum.

Natural distribution: Japan.

Acer monspessulanum. MONTPELIER MAPLE.

Location: Fruticetum.

Natural distribution: Southern Europe, northern Africa, and
western Asia.

Acer Negundo. ASH-LEAVED MAPLE.

Location: Arboretum. North side of depot plaza. Opposite
approach to Elevated Railway.

Natural distribution: Eastern North America.

- Acer Negundo** var. **auratum**. GOLDEN ASH-LEAVED MAPLE.
Location: Arboretum.
- Acer Negundo** var. **variegatum**. VARIEGATED ASH-LEAVED MAPLE.
Location: Arboretum.
- Acer nikoense**. NIKO MAPLE.
Location: Arboretum.
Natural distribution: Japan and central China.
- Acer palmatum**. JAPANESE MAPLE.
Location: Fruticetum.
Natural distribution: Japan.
- Acer palmatum** var. **atropurpureum**. PURPLE-LEAVED JAPANESE MAPLE.
Location: Fruticetum.
- Acer palmatum** var. **dissectum rubellum**. RED FERN-LEAVED JAPANESE MAPLE.
Location: Fruticetum.
- Acer palmatum** var. **Hessei**. HESSE'S JAPANESE MAPLE.
Location: Fruticetum.
- Acer palmatum** var. **minus**. SMALL-LEAVED JAPANESE MAPLE.
Location: Fruticetum.
- Acer palmatum** var. **roseo-marginatum**. ROSE-MARGINED JAPANESE MAPLE.
Location: Fruticetum.
- Acer palmatum** var. **rubrum**. RED JAPANESE MAPLE.
Location: Fruticetum.
- Acer palmatum** var. **sanguineum**. BRIGHT-RED JAPANESE MAPLE.
Location: Fruticetum.
- Acer palmatum** var. **septemlobum**. SEVEN-LOBED JAPANESE MAPLE.
Location: Arboretum.
- Acer palmatum** var. **sinuatum**. NARROW-LOBED JAPANESE MAPLE.
Location: Fruticetum.
- Acer pennsylvanicum**. STRIPED MAPLE.
Location: Arboretum.
Natural distribution: Eastern North America.

Acer platanoides. NORWAY MAPLE.

Location: South side of depot plaza. Along path west of the Museum. Along road east of the Museum.

Natural distribution: Europe and Caucasus.

Acer platanoides var. **cucullatum.** HOOD-LEAVED NORWAY MAPLE.

Location: Arboretum.

Acer platanoides var. **dissectum.** CUT-LEAVED NORWAY MAPLE.

Location: Arboretum.

Acer platanoides var. **globosum.** ROUND-HEADED NORWAY MAPLE.

Location: Arboretum.

Acer platanoides var. **Reitenbachii.** REITENBACH'S NORWAY MAPLE.

Location: Arboretum.

Acer platanoides var. **Schwedleri.** SCHWEDLER'S NORWAY MAPLE.

Location: Arboretum.

Acer Pseudo-platanus. SYCAMORE MAPLE.

Location: Arboretum. Along path near fountain at foot of Museum approach. Along path north of Conservatory Range 1.

Natural distribution: Europe and Caucasus.

Acer Pseudo-platanus var. **Leopoldii.** LEOPOLD'S SYCAMORE MAPLE.

Location: Arboretum.

Acer Pseudo-platanus var. **purpurascens.** PURPLE SYCAMORE MAPLE.

Location: Arboretum.

Acer rubrum. RED MAPLE.

Location: Arboretum. Wild, common.

Natural distribution: Eastern North America.

Acer rubrum var. **globosum.** ROUND-HEADED RED MAPLE.

Location: Arboretum.

Acer rufinerve. RED-NERVED MAPLE.

Location: Arboretum.

Natural distribution: Japan.

NOTES, NEWS AND COMMENT

Miss E. M. Kittredge, custodian of the lantern slide collection, left early in April for Woodstock, Vermont, where she will spend a part of the spring.

The Pacific Slope and adjacent Rocky Mountains are represented in a large collection of plants from British Columbia, Alberta, Washington, Oregon, and California, obtained by exchange with the Field Museum of Natural History.

Among recent visitors at the Museum Building were Dr. J. W. Harshberger, of the University of Pennsylvania, Dr. W. W. Tupper, of Newtonville, Mass., Mr. Wilbur A. Brotherton, of the University of Michigan, and Miss Minerva Hart, librarian of the public library, Port of Spain, Trinidad.

Short notes have been appearing in the daily press at frequent intervals during the past month, calling the attention of the public to special features of immediate interest in the greenhouses or on the grounds of the New York Botanical Garden. The notes have evidently been read by numerous persons, many of whom have visited the Garden as a result.

A collection of about twenty-two hundred miscellaneous specimens of flowering plants from various parts of the Philippine Islands has been received for the herbarium. This acquisition represents an important addition to our large series of Philippine plants, which is built up mainly of the collections of Mr. R. S. Williams, Dr. C. B. Robinson, and the various collectors of the Bureau of Science of the Philippine government.

Professor Kemp has recently found among other stored articles in the Department of Geology of Columbia University a notebook of the late Professor John Strong Newberry, containing notes in French taken by him while a student, and covering the lectures on Botany delivered by Professor Brongniart in Paris in 1849 and 1850. Through Professor Harper, Professor Kemp has transmitted this very interesting document to the Garden for preservation, and it has been added to the library.

Herbert Huntington Smith, curator of the Museum of the Geological Survey of Alabama since 1910, was killed by a freight train in Alabama on March 22. Professor Smith was very deaf and failed to hear the approaching train. Though best known as a collector in branches of natural science other than botanical in South America, Mexico, and the West Indies, Professor Smith once made a notable collection of plants in Colombia, the determinations of which were made chiefly by Dr. H. H. Rusby of the Garden staff.

Dr. P. A. Rydberg has again added to his published contributions on the flora of the Rocky Mountain region. His latest work bears the title "Key to the Rocky Mountain Flora," and is a reprint of the keys in his larger manual "Flora of the Rocky Mountains and Adjacent Plains." It is a neat little book of pocket size, printed on thin paper with narrow margins and bound in flexible red covers, and will be especially convenient for botanists and tourists who wish a compact portable book for field work.

Meteorology for February.—The total precipitation for the month was 2.80 inches of which 0.12 inches ($1\frac{1}{4}$ inches snow measurement) fell as snow. The maximum temperatures recorded at the Garden for each week were 53° on the 3d, 47° on the 13th, 49° on the 20th, and 50° on the 24th. The minimum temperatures were 20° on the 7th, 14° on the 11th, and 20° on the 20th and 27th.

Meteorology for March.—The total precipitation for the month was 4.15 inches including 0.45 inches ($4\frac{1}{2}$ inches snow measurement) of snow. The maximum temperatures recorded at the Garden for each week were 61° on the 5th, 63° on the 13th, 69° on the 21st, and 63° on the 25th. The minimum temperatures were 24° on the 7th, 26° on the 15th, 34° on the 23d, and 23° on the 30th.

The site for the War Memorial plantation of Douglas Spruce, referred to in the January number of the JOURNAL, has been regulated and graded and path connections built to it during the

month of March, the mild weather having permitted operations which in ordinary seasons could not have been accomplished until April. The area selected is about one acre in extent on a gentle slope to the northeast, situated near the entrance to the Horticultural Garden on the Southern Boulevard. An old farm-road which traversed the area had to be broken up and many large rocks and boulders removed. The stone obtained in the grading work supplied all required for the Telford foundations of the paths, and an unsightly portion of the grounds has been greatly improved. Planting of the trees was commenced during the first week of April.

Mrs. Henry O. Taylor, one of the members of the Women's Auxiliary, has presented to the library of the Garden an unusually fine copy of Piso's valuable work on the natural history and medicine of the Indies (*De Indiae utriusque re naturali et medica*), published at Amsterdam by the famous printers Louis and Daniel Elzvir in 1658. More than half of the volume is occupied by Piso's own observations upon the animals and plants of Brazil during a residence of eight years (1637-44) in that country, and the work is a classic among those relating to the flora of eastern tropical South America. This copy is of particular interest because it was presented by the author to a friend, a young student of medicine, and bears an inscription to that effect in a beautifully clear hand, at the bottom of the engraved title-page, signed "G: Piso."

The fourth floor of the Museum Building at the Garden has been overcrowded as a result of the steady growth of the collections and library which are housed there, until it has become necessary to remove a portion of the collections to the floor below. The exhibition cases of the Systematic collection have been rearranged, vacating the west wing of the third floor. This wing has been partitioned off from the remainder of the floor and divided into three small rooms to be used as studies and a large room for the collections. The entire herbarium of thallophytes, except the lichens, is now housed in this room, while the studies are occupied by Dr. Murrill, supervisor of

public instruction, Dr. Howe, curator of algae, and Dr. Seaver, curator of fungi. Besides bringing together the thallophyte collections in one room and providing more comfortable quarters for the members of the staff primarily concerned with them, this rearrangement sets free about three thousand square feet of floor space on the fourth floor, which has been greatly needed for other purposes.

Some time ago the New York Botanical Garden received in exchange with the Field Museum of Chicago a number of herbarium specimens, among which was a set of duplicates from the collection of the late Dr. J. H. Schuette of Green Bay, Wisconsin. Dr. Schuette was an enthusiastic collector and knew the flora of northeastern Wisconsin very well. Unfortunately he published but little, so that his fellow-botanists did not fully appreciate the extent of his botanical investigations and observations. He was especially interested in the native species of roses and published one short article on them in volume 46 of the *Proceedings of the American Association for the Advancement of Science*, in which he proposed one new species and a dozen or more varieties. His descriptions were very short, comprising a line or two each, so that a student of the genus might be inclined from the mere reading of the article to discredit his work. But the collection of specimens now in the Garden herbarium and a similar one in the Gray Herbarium are both accompanied by copious notes by Dr. Schuette, which throw an entirely different light on his work. His new species is indeed very distinct, as is also a second unpublished species which he had held in manuscript. Most of his varieties, on the other hand, are apparently natural hybrids, and his notes show that he had regarded them as such even at the time of publication. Few American botanists, if any, have given such careful attention to our native hybrid roses as Dr. Schuette, although he did not choose to express his convictions publicly and described them as varieties.

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EDITOR

H. A. GLEASON

First Assistant



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PUBLICATIONS OF THE STAFF, SCHOLARS AND STUDENTS OF THE NEW YORK BOTANICAL GARDEN DURING THE YEAR 1918

Andrews, A. L. Bryological notes—IV. A new hybrid in *Physcomitrium*. *Torreyana* 18: 52-54. 10 Ap 1918.

——— A collection of mosses from North Carolina. *Bryologist* 21: 61-67. 16 S 1918.

Barnhart, J. H. Historical sketch of the Torrey Botanical Club. *Mem. Torrey Club* 17: 12-21. 10 Je 1918.

——— Report of the Bibliographer [for 1917]. *Bull. N. Y. Bot. Gard.* 9: 451. 30 Ap 1918.

Bicknell, E. P. The ferns and flowering plants of Nantucket—XIX. *Bull. Torrey Club* 45: 365-383. 20 S 1918.

——— *Aster laevis*. *Addisonia* 3: 47, 48. *pl.* 104. 30 S 1918.

——— *Ilex verticillata*. *Addisonia* 3: 71, 72. *pl.* 116. 30 D 1918.

Boas, H. M. The individuality of the bean pod as compared with that of the bean plant. *Mem. Torrey Club* 17: 207-209. 10 Je 1918.

——— The relationship between the number of sporophylls and the number of stamens and pistils—a criticism. *Bull. Torrey Club* 45: 343-345. 9 S 1918.

Boynton, K. R. *Lepadena marginata*. *Addisonia* 3: 11, 12. *pl.* 86. 30 Mr 1918.

——— *Helianthus orgyalis*. *Addisonia* 3: 25. *pl.* 93. 29 Je 1918.

- *Stylophorum diphylum*. Addisonia 3: 31, 32. pl. 96. 29 Je 1918.
- Britton, E. G.** Annual reports—Sullivant Moss Society—1917. Report of the President. Bryologist 21: 19. 15 Mr 1918.
- "The catkin-hypnum with long hoses." Bryologist 21: 32. 30 Ap 1918.
- Mosses from Florida collected by Severin Rapp. Bryologist 21: 27, 28. 30 Ap 1918.
- *Musci*. In Britton, N. L., Flora of Bermuda. 430-448. 28 F 1919. [Illust.]
- *Jagerinopsis squarrosa* n. sp. Bryologist 21: 48-50. pl. 24. 30 Jl 1918.
- Further notes on *Jagerinopsis*, Broth. Bryologist 21: 8. Issue for S 1918.
- *Porotrichum* not *Thamnobryum*. Bryologist 21: 83, 84. Issue for S 1918.
- Report of the Honorary Curator of Mosses [for 1917]. Bull. N. Y. Bot. Gard. 9: 463-465. 30 Ap 1918.
- Britton, N. L.** The relatives of catalpa trees in the West Indies. Jour. N. Y. Bot. Gard. 19: 6-9. pl. 209. Issue for Ja 1918.
- Flora of Bermuda. i-xi + 1-585. 28 F 1918. [Illust.]
- *Aronia atropurpurea*. Addisonia 3: 1. pl. 81. 30 Mr 1918.
- *Opuntia lasiocantha*. Addisonia 3: 19, 20. pl. 90. 30 Mr 1918.
- An undescribed *Scirpus* from California. Torreyia 18: 36. f. 1. 8 Mr 1918.
- First grant from the income of the Charles Budd Robinson fund. Jour. N. Y. Bot. Gard. 19: 47, 48. Issue for Mr 1918.
- The Herbaceous Grounds. Jour. N. Y. Bot. Gard. 19: 77-79. Issue for Ap 1918.
- John Adolph Shafer. Jour. N. Y. Bot. Gard. 19: 97-99. Issue for My 1918.
- A red pine plantation. Jour. N. Y. Bot. Gard. 19: 105, 106. Issue for My 1918.

- Torrey Botanical Club reminiscences. Mem. Torrey Club **17**: 24-28. 10 Je 1918.
- *Aronia arbutifolia*. Addisonia **3**: 33. pl. 97. 29 Je 1918.
- The Flora of the American Virgin Islands. Brooklyn Bot. Gard. Mem. **1**: 19-118. 6 Jl 1918.
- The school garden shelter house given by Mrs. Frederick Ferris Thompson. Jour. N. Y. Bot. Gard. **19**: 179, 180. Issue for Au 1918.
- James Alexander Scrymser. Jour. N. Y. Bot. Gard. **19**: 180, 181. Issue for Au 1918.
- The botany and plant products of northern South America. Jour. N. Y. Bot. Gard. **19**: 182-185. Issue for Au 1918. Published also in Science II. **48**: 156. 1918.
- Byron David Halsted. Jour. N. Y. Bot. Gard. **19**: 221. Issue for S 1918.
- *Opuntia Opuntia*. Addisonia **3**: 49, 50. pl. 105. 30 S 1918.
- Report of the Secretary and Director-in-Chief for the year 1917. Bull. N. Y. Bot. Gard. **9**: 403-433. 30 Ap 1918.
- Burlingham, G. S.** A preliminary report on the *Russulae* of Long Island. Mem. Torrey Club **17**: 301-306. 10 Je 1918.
- Coker, D.** Revision of the North American species of *Encalypta*. Bull. Torrey Club **45**: 433-449. pl. 13, 14. 15 N 1918.
- Harlow, S. H.** Report of the Librarian [for 1917]. Bull. N. Y. Bot. Gard. **9**: 449, 450. 30 Ap 1918.
- Hollick, A.** *Aster Novae-angliae*. Addisonia **3**: 3. pl. 82. 30 Mr 1918.
- Torrey Botanical Club reminiscences. Mem. Torrey Club **17**: 29, 30. 10 Je 1918.
- Report of the Honorary Curator of fossil plants [for 1917]. Bull. N. Y. Bot. Gard. **9**: 463. 30 Ap 1918.
- Howe, M. A.** *Algae*. In Britton, N. L., Flora of Bermuda. 489-540. 28 F 1918.
- Marine algae and marine spermatophytes of the Thomas Barrera Expedition to Cuba. Smithsonian Misc. Coll. **68**¹¹: 1-13. 9 Ap 1918. [Illust.]

- Further notes on the structural dimorphism of sexual and tetrasporic plants in the genus *Galaxaura*. Brooklyn Bot. Gard. Mem. 1: 191-197. *pl.* 3, 4+f. 1-4. 6 Jl 1918.
- Calcareous algae from Murray Island, Australia, and Cocos-Keeling Islands. Carnegie Inst. Wash. Publ. 213: 291-296. *pl.* 97, 98. 16 Au 1918.
- The new dahlia border. Jour. N. Y. Bot. Gard. 19: 185-192. Issue for Au 1918.
- The dahlia border. Jour. N. Y. Bot. Gard. 19: 291, 292. Issue for N 1918.
- Murrill, W. A.** The delicious fruits of *Actinidia*. Jour. N. Y. Bot. Gard. 18: 257-259. Issue for D 1917.
- Growing walnuts for food. Jour. N. Y. Bot. Gard. 19: 9-11. Issue for Ja 1918.
- The Agaricaceae of tropical North America—VII. Mycologia 10: 15-33. 14 F 1918; —VIII. Mycologia 10: 62-85. 4 Ap 1918.
- Murrill's and Saccardo's names of polypores compared. 1-31. New York. Mr 1918.
- The Tree of Saint Louis in the Forest of Fontainebleau. Am. Mus. Jour. 18: 305-307. Issue for Ap 1918. [Illust.]
- Illustrations of fungi—XXVIII. Mycologia 10: 107-110. *pl.* 6. 7 Je 1918; —XXIX. Mycologia 10: 177-181. *pl.* 8. 4 S 1918.
- Collecting fungi at the Delaware Water Gap. Mem. Torrey Club 17: 48-51. 10 Je 1918.
- The rosy-spored agarics of North America. Brooklyn Bot. Gard. Mem. 1: 334-336. 6 Jl 1918.
- Billy the Boy Naturalist. i-ii + 1-252. *f.* 1-43. New York. 14 Au 1918.
- Three Young Crusoes. i-xiv + 1-218. *pl.* 1, 2 + *f.* 1-83. New York. 30 D 1918.
- Cuban polypores and agarics. Mycologia 11: 22-32. 21 D 1918.
- Report of the Assistant Director (for 1917). Bull. N. Y. Bot. Gard. 9: 433-440. 30 Ap 1918.
- Nash, G. V.** Hardy woody plants in the New York Botanical

- Garden. Jour. N. Y. Bot. Gard. 18: 242-250; 19: 11-15, 58-62, 86-91, 108-112, 139-142, 167-171, 192-196, 222-225, 293-296.
- Injury to evergreens. Jour. N. Y. Bot. Gard. 19: 48-50. Issue for Mr 1918; Jour. N. Y. Bot. Gard. 19: 159-164. Issue for Jl 1918.
- *Euonymus alata*. Addisonia 3: 7, 8. pl. 84. 30 Mr 1918.
- *Maackia amurensis Buergeri*. Addisonia 3: 13, 14. pl. 87. 30 Mr 1918.
- *Cornus officinalis*. Addisonia 3: 17-18. pl. 89. 39 Mr 1918.
- *Cotoneaster Simonsii*. Addisonia 3: 21, 22. pl. 91. 29 Je 1918.
- *Symphoricarpos albus laevigatus*. Addisonia 3: 27. pl. 94. 29 Je 1918.
- *Hamamelis japonica*. Addisonia 3: 35, 36. pl. 98. 29 Je 1918.
- *Sobrolea sessilis*. Addisonia 3: 39, 40. pl. 100. 29 Je 1918.
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- *Callicarpa japonica*. Addisonia 3: 45. pl. 103. 30 S 1918.
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CONFERENCE NOTES FOR FEBRUARY AND MARCH

The regular monthly conference of the staff and registered students of the Garden was held on the afternoon of February 5, 1919.

Dr. Marshall A. Howe discussed the North American species of *Liagora*, illustrating his talk by specimens, both dry and in fluid, and showing the microscopic structure of the plants by drawings. The following is an abstract of his remarks:

"*Liagora* is a genus of red algae, confined in its geographic distribution to the warmer seas, its species being found chiefly in water that is normally agitated. The speaker recognized ten species as occurring in North American waters, one of these being Californian and the other nine, including two about to be described as new, being found in the West Indian region, some of them ranging as far north as Bermuda. The original specimens or at least authentic material of all the species attributed to North America have been examined and as a result some reductions of names to synonymy have been made. Special attention has been given to the character and mode of distribution of the antheridia, important characters that hitherto have been rarely mentioned in the describing of species. Nothing has been found that could be certainly interpreted as tetraspores or as a non-sexual alternating generation bearing sporangia of any kind. However, at least four of the West Indian species often show minute flat orbicular discs lying on the general surface of the plant or somewhat immersed among the assimilatory filaments. The darker red color of these discs, their dorsiventral rather than radial symmetry, and the lack of any very obvious genetic continuity with the *Liagora* give plausibility to the first impression that they are independent organisms or perhaps obligate parasites of species of *Liagora*. But the truth seems to be that they arise from gonidia, gemmae, or aplanospores derived from the terminal or subterminal cells of the assimilatory filaments of the *Liagora*. This was the view of Kützing, who described and figured similar structures in a Red Sea species of *Liagora* as long ago as 1858, since which time nothing seems to have been added to our knowl-

edge of these curious bodies, and Kützing's observations appear to have been overlooked or ignored by subsequent writers on the genus."

The subject "Seed sterility in plants that reproduce vegetatively" was presented by Dr. A. B. Stout. The principal views as to the cause of such sterility were briefly presented and discussed and a report was made of some original research bearing on the phenomena.

Seed sterility has long been recognized as frequent and often complete for numerous species, both wild and cultivated, which are freely and naturally propagated by such vegetative organs as roots, tubers, bulbs or rhizomes. The view has very generally prevailed that in such cases the vegetative organs prevent the development of seeds by diverting and utilizing the food supply that is available. The vegetative organs, it is thought, obtain food at the expense of the structures of seed reproduction; an assumed relationship which has been called "compensation of growth" by Darwin and "quantitative correlation" by Goebel.

However, present day knowledge of seed sterility in plants that reproduce by seeds, or like the apple are propagated vegetatively by artificial grafting, shows that in many species fertility and sterility are relative and are to be ascribed to some element of physiological relation operating between the sex organs themselves. In such cases plants that are seed sterile to self-pollination are highly productive of seed in certain cross-relations. Also sister plants of identical vegetative habit grown under same conditions may be highly self-fertile. In other words, the fertility is relative.

Evidence is increasing to the effect that seed-fertility in plants which propagate vegetatively may be relative. Such experimental evidence consists in finding self-fertile plants along with self-sterile plants, or in finding that the "seed-sterile" plants will produce seed when properly crossed. In plants widely propagated vegetatively it is necessary to obtain a stock from a different seed source if one is to test most adequately intra-specific fertility.

Experimental studies bearing on this question have been under

progress at the Garden for a number of years. The results with species of *Hemerocallis* may be reported here. Two species of this genus are well-known garden plants. One has lemon-colored flowers (*Hemerocallis flava*) and one has orange flowers (*H. fulva*). The literature for *H. flava* shows that some plants are self-fertile and others are self-sterile. It appears, however, that *H. fulva* has never been known to produce fruit and seeds. Even the oldest references either make no mention of pods or state that they are not formed.

Plants of *H. flava* growing at the New York Botanical Garden were found to be highly self-fertile; plants of *H. fulva* were completely sterile to all self-pollination and to intra-varietal cross-pollination. A third species, *H. Thunbergii*, was found to be feebly or partially fertile to self-pollination. Pollen of *H. fulva* applied to pistils of *H. flava* led to the production of pods and viable seeds, but the reciprocal cross failed. Pollen of *H. Thunbergii* was applied to a large number of pistils of *H. fulva* and two pods with seeds were obtained.

The three species are quite alike in vegetative habit and the results thus far obtained suggest that the seed-sterility in evidence is due to physiological incompatibility operating between organs of reproduction rather than to purely nutritive relations operating between organs of vegetative reproduction on the one hand and fruit and seed structures on the other. This is especially clear in the case of *H. flava*. It is however possible that both conditions are operating.

The results obtained with species of *Hemerocallis* were illustrated by photographs and by pods obtained in the experiments.

A conference of the scientific staff and the registered students of the Garden was held on the afternoon of March 5. Mrs. Britton exhibited the collections of mosses belonging to the New York Botanical Garden from the Bahamas made on the explorations which were begun in April, 1904. These collections include about fifty sheets and two hundred specimens, which are referable to fourteen families, twenty-seven genera and thirty-five

species, of which thirty-one species also occur in Florida and eight in Bermuda. Only one of these is apparently undescribed and endemic, *Hymenostomum flavescens*; two are extensions of range southward, *Desmatodon Garberi*, which has heretofore only been known in Florida, and *Schlotheimia Sullivantii*; four are extensions of range northward of the following West Indian and South American species, *Fissidens monandrus*, *F. radicans*, *Syrrophodon Gaudichaudii*, and *Trichostomum rivale*; four are cosmopolitan, *Funaria hygrometrica* and *F. flavicans*, *Bryum capillare*, and *B. coronatum*. Reference was made to the fact that New Providence is the type locality for *Octoblepharum albidum*. Descriptions will appear in the Flora of the Bahamas, now in press. Keys to the families were exhibited.

Comment and discussion was stimulated by the fact that twelve of the thirty-five species are only known from sterile specimens, which apparently are maintaining a precarious existence, as five of them are propagating only by brood-bodies, while several others are distributed by brittle stems, branches, or leaves. Dr. Harper made the point that these were all offshoots from the gametophyte and Mrs. Britton replied that in several mosses, notably *Hyophila riparia*, where the paraphyses surrounding the undeveloped archegonia produced propagulae and in one case of *Octodiceras Juilana*, where the calyptra gave rise at apex to the protonema, these vestigial organs derived from the gametophyte were carried over with the sporophytic stage.

Mr. R. S. Williams reported on "The Genus *Desmatodon* in North America and southward to Colombia and the West Indies." The work on this genus was mostly done some four or five years ago, and but little has since occurred to cause any important changes. Twelve species are now included in the genus as against thirteen in the Lesq. & James' Manual, but two of these thirteen species, *D. neomexicanus* and *D. nervosus* belong to *Tortula* while one other, *D. arenaceus* is reduced to *D. obtusifolius*. This leaves ten of the Manual species, the two additions being *D. Sprengelii*, originally from Santo Domingo and discovered in Florida in 1916 by Dr. Small, and *D. stomatodonta* from Jalisco, Mexico.

Desmatodon Bushii Card. & Ther. from Missouri belongs to *Tortula*, *fide* Brotherus. *D. Sartorii* (C.M.) Paris, from Mexico, is a *Leptodontium* and *D. systylioides* Ren. & Card. from Newfoundland a *Pottia*.

As here constituted the species of *Desmatodon* have leaves broad in the upper half, sometimes even slightly spatulate, the leaf-margins flat or revolute, without border or with a colored or thickened border of two layers of cells and costa in cross-section showing a single stereid band below the 2 to 4 mostly large guide-cells. The capsule is annulate, the 16 teeth of the peristome densely papillose and more or less divided into 2 or 3 forks sometimes very irregular. The type species is *Dicranum latifolium* of Hedwig.

A. B. STOUT,
Secretary of the Conference

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

Acer saccharinum. SILVER MAPLE.

Location: Near Power House 1. Along road south of Museum.

Natural distribution: Eastern North America.

Acer saccharinum var. **Weiri.** WEIR'S MAPLE.

Location: Arboretum.

Acer Saccharum. SUGAR MAPLE.

Location: Arboretum. Wild, common.

Natural distribution: Eastern North America.

Acer Saccharum var. **monumentale.** UPRIGHT SUGAR MAPLE.

Location: Arboretum.

Acer tataricum. WHITE-FLOWERED MAPLE.

Location: Arboretum. Fruticetum.

Natural distribution: Southeastern Europe and the Orient.

AESCULACEAE. Horse-chestnut Family

Aesculus. HORSE-CHESTNUT

Aesculus carnea. RED-FLOWERED HORSE-CHESTNUT.

Location: Arboretum.

Horticultural origin.

Aesculus glabra. OHIO BUCKEYE.

Location: Arboretum.

Natural distribution: South Central United States.

Aesculus Hippocastanum. COMMON HORSE-CHESTNUT.

Location: Arboretum. Along path from 200th Street entrance to elevated approach. Triangle near Herbaceous Grounds.

Natural distribution: Northern Greece and Bulgaria.

Aesculus Hippocastanum var. **Baumannii.** DOUBLE-FLOWERED WHITE HORSE-CHESTNUT.

Location: Arboretum.

Aesculus octandra. SWEET BUCKEYE.

Location: Arboretum.

Natural distribution: Southeastern United States.

Aesculus parviflora. SMALL-FLOWERED BUCKEYE.

Location: Fruticetum. West border, near upper end of upper lake.

Natural distribution: Southeastern United States.

Aesculus Pavia. RED BUCKEYE.

Location: Arboretum.

Natural distribution: Southeastern United States.

Aesculus turbinata. JAPANESE HORSE-CHESTNUT.

Location: Arboretum.

Natural distribution: Japan.

SAPINDACEAE. Soapberry Family

Koelreuteria. VARNISH TREE**Koelreuteria paniculata.** VARNISH TREE.

Location: Arboretum. Along path south of Museum.

Natural distribution: Japan, Corea, and China.

Xanthoceras. XANTHOCERAS**Xanthoceras sorbifolia.** XANTHOCERAS.

Location: Fruticetum.

Natural distribution: Northern China.

RHAMNACEAE. Buckthorn Family

Paliurus. CHRIST'S THORN**Paliurus Paliurus.** CHRIST'S THORN.

Location: Fruticetum.

Natural distribution: Southern Europe and western Asia.

Zizyphus. JUJUBE**Zizyphus Zizyphus.** JUJUBE.

Location: Fruticetum.

Natural distribution: Mediterranean Region and temperate Asia.

Zizyphus Zizyphus var. **inermis.** SPINELESS JUJUBE.

Location: Fruticetum.

Rhamnus. BUCKTHORN**Rhamnus alpina.** ALPINE BUCKTHORN.

Location: Fruticetum.

Natural distribution: Southern Europe.

Rhamnus cathartica. PURGING BUCKTHORN.

Location: Fruticetum.

Natural distribution: Europe and western and northern Asia.

Rhamnus dahurica. DAHURIAN BUCKTHORN.

Location: Fruticetum.

Natural distribution: Central Asia to Amur Region.

Rhamnus Frangula. ALDER BUCKTHORN.

Location: Fruticetum. Economic Garden.

Natural distribution: Europe, northern Africa, western Asia, and Siberia.

Rhamnus Pallasii. PALLAS'S BUCKTHORN.

Location: Fruticetum.

Natural distribution: Transcaucasia to Armenia and northern Persia.

Rhamnus utilis. USEFUL BUCKTHORN.

Location: Fruticetum.

Natural distribution: Central and eastern China.

Ceanothus. CEANOTHUS**Ceanothus americanus.** NEW JERSEY TEA.

Location: Fruticetum. Economic Garden.

Natural distribution: Eastern North America.

VITACEAE. Grape Family

Vitis. GRAPE**Vitis cordifolia.** FROST GRAPE.

Location: Viticetum.

Natural distribution: Eastern United States.

Vitis Labrusca. NORTHERN FOX GRAPE.

Location: Viticetum.

Natural distribution: Eastern United States.

Vitis palmata. MISSOURI GRAPE.

Location: Viticetum.

Natural distribution: Illinois to Arkansas.

Parthenocissus. PARTHENOCISSUS**Parthenocissus quinquefolia.** VIRGINIA CREEPER.

Location: Wild, common.

Natural distribution: Eastern North America, Mexico, Cuba, and the Bahamas.

Parthenocissus tricuspidata. JAPANESE IVY.

Location: Approach to Elevated Railway. 204th Street Bridge.

Natural distribution: Japan and central China.

Parthenocissus tricuspidata var. **Lowii.** LOW'S JAPANESE IVY.

Location: Viticetum.

Ampelopsis. AMPELOPSIS**Ampelopsis aconitifolia.** ACONITE-LEAVED AMPELOPSIS.

Location: Viticetum.

Natural distribution: Northern China.

Ampelopsis heterophylla. VARIOUS-LEAVED AMPELOPSIS.

Location: Viticetum.

Natural distribution: Eastern Asia.

Ampelopsis humulifolia. HOP-LEAVED AMPELOPSIS.

Location: Viticetum.

Natural distribution: Northern China.

TILIACEAE. Linden Family

Tilia. LINDEN**Tilia americana.** AMERICAN LINDEN.

Location: Arboretum. Along path west of Museum. Along approach to the Mosholu Bridge.

Natural distribution: Eastern North America.

Tilia cordata. SMALL-LEAVED LINDEN.

Location: Arboretum.

Natural distribution: Europe.

Tilia euchlora. CRIMEAN LINDEN.

Location: Arboretum.

Natural distribution: Orient.

ACCESSIONS

MUSEUMS AND HERBARIUM

23 specimens of flowering plants from Washington. (By exchange with the Field Museum of Natural History.)

1 specimen of *Cheilanthes Eatonii* from Oklahoma. (By exchange with Mr. B. F. Bush.)1 specimen of the wood of *Amyris balsamifera* from Puerto Cabello, Venezuela. (Given by Mr. C. H. Pearson.)1 specimen of *Petriphytum caespitosum* from Arizona. (Given by Miss Delia W. Marble.)

10 colored lantern slides. (By purchase.)

713 specimens of flowering plants from the western United States. (By exchange with the California Academy of Sciences.)

1 specimen of *Bjerkandera fumosa* from France. (By exchange with G. W. Martin.)1 specimen of *Corticium effuscatum* from New York. (By exchange with Dr. W. H. Ballou.)

2 specimens of fungi from California. (By exchange with Professor H. E. Parks.)

1 specimen of *Bjerkandera fumosa* from Utah. (By exchange with Professor A. O. Garrett.)27 specimens of *Phyllosticta* from Wisconsin. (Given by Dr. J. J. Davis.)

533 specimens of fungi from Porto Rico. (Collected by Professor H. H. Whetzel and Dr. E. W. Olive.)

- 118 specimens of flowering plants from Alberta, British Columbia, and Oregon. (By exchange with the Field Museum of Natural History.)
- 1 specimen of *Corticium phyllophilum* from New York. (By exchange with Dr. W. H. Ballou.)
- 70 colored lantern slides. (Given by Mrs. N. L. Britton.)
- 131 specimens of flowering plants from Colombia. (Given by Dr. M. T. Dawe.)
- 1 specimen of *Thecopholus americana* from Florida. (By exchange with the University of Florida.)
- 10 specimens of barley, rye, and buckwheat for the economic museum. (By exchange with the Bureau of Plant Industry.)
- 30 uncolored lantern slides. (Given by Mrs. N. L. Britton.)
- 135 specimens of flowering plants from Oregon. (By exchange with the Field Museum of Natural History.)

LIBRARY ACCESSIONS FROM FEBRUARY 1 TO APRIL 21, 1919

- ARNAUD, G. *Les Astérinées*. Montpellier, 1918. (Given by the author.)
- Board of education of the city of New York. Minutes of the committee on special schools. 1908. (Given by Mr. Percy Wilson.)
- BOERKER, RICHARD HANS DOUAI. *Our national forests*. New York, 1918. (Given by Mrs. N. L. Britton.)
- BRACKENRIDGE, WILLIAM D. *Atlas. Botany. Cryptogamia. Filices* [of the Wilkes expedition.] Philadelphia, 1855.
- CASE, MARY. *Paintings of wild flowers*. 2 vols. (Given by Mr. Eckstein Case.)
- The Century dictionary*. Vols. 1-6. New York, 1889-91. (Given by Miss E. M. Kittredge.)
- COULTER, JOHN MERLE. *Plant relations; a first book of botany*. New York, 1900. (Given by Miss E. M. Kittredge.)
- DANA, FRANCES THEODORA. *How to know the wild flowers*. New ed., 1897. (Hand illuminated by Miss Mary Case; presented by Mr. Eckstein Case.)
- EGLESTON, NATHANIEL HILLIER. *Hand-book of tree-planting*. New York, 1884. (Given by Miss E. M. Kittredge.)
- ELY, HELENA RUTHERFURD. *A woman's hardy garden*. New York, 1905. (Given by Miss E. M. Kittredge.)
- Floral poesy*. London, n. d. (Given by Miss E. M. Kittredge.)
- GOODALE, GEORGE LINCOLN. *Concerning a few common plants*. Ed. 2. Boston, 1903. (Given by Miss E. M. Kittredge.)
- HALE, GERTRUDE ELISABETH. *Little flower people*. Boston, 1887. (Given by Miss E. M. Kittredge.)
- HOOVER, LUCY. *The lady's book of flowers and poetry*. New York, 1859. (Given by Miss E. M. Kittredge.)
- ILDREWE, MISS. *The language of flowers*. Boston, 1865. (Given by Miss E. M. Kittredge.)
- ITO, KEISUKÉ. [The description of natural products of Japan.] 3 vols. [Tokyo] n. d. (Given by American Museum of Natural History.)
- ITO, KEISUKÉ. [The illustrations and descriptions of Japanese flora.] Vol. 1. [Tokyo, 1874]. (Given by American Museum of Natural History.)
- JOHNSON, DUNCAN STARR. *The fruit of Opuntia fulgida; a study of perennation and proliferation in the fruits of certain Cactaceae*. Washington, 1918. (Given by Dr. N. L. Britton.)

- MILLER, LEO EDWARD. *In the wilds of South America*. New York, 1918.
 PACK, CHARLES LATHROP. *The war garden victorious*. Philadelphia, 1919.
 PISO, WILLEM. *De Indiae utriusque re naturali et medica libri quatuordecim*. Amstelredami, 1658. (Given by Mrs. Henry O. Taylor.)
 SMALL, JOHN KUNKEL. *Ferns of Royal Palm Hammock*. New York, 1918. (Given by Dr. J. K. Small.)
 THORBURN, GEORGE C. *Catalogue of kitchen garden, herb, flower, tree and grass seeds . . . gardening, agricultural, and botanical books . . .* New York, 1838.
 VRIES, HUGO DE. *Opera e periodicis collata*. Vol. 2. Utrecht, 1918.

NOTES, NEWS AND COMMENT

Ground was broken April 14 for the new coal bunkers in connection with Power House no. 1. The roof will be constructed of reinforced concrete. They will increase the storage capacity at this power house to about 800 tons of coal. The earth removed in the excavation is being used to fill depressions near the Horticultural Grounds.

Dr. J. K. Small, head curator, left April 22 for a collecting trip in Florida under the patronage of Mr. Charles Deering. He will devote a considerable portion of his time to a continuation of his studies on the Florida cactuses.

Each year of growth adds to the beauty of the Japanese Cherry collection. The first species, *Prunus subhirtella*, was in full bloom by April 15, and other species followed for three weeks. The display attracted thousands of visitors.

During the severe blizzard early in April, the temperature reached a minimum of 21° and remained below the freezing-point for over twenty-four hours consecutively. Fortunately, little damage was done to the Garden plants except to some whose flowers had already opened. Practically all the flowers of the early-blooming honeysuckles, possibly three fourths of the Forsythia flowers, and a half of the magnolias blossoms were blighted. Nevertheless, the unopened buds were so well protected by their natural coverings that they were entirely uninjured and later developed normal flowers.

The first lectures of this year for school children were given at the Garden on April 23, 25, 29, 30 and May 2, by Dr. H. H. Rusby, Dr. F. J. Seaver, Dr. W. A. Murrill, Mr. George V. Nash, and Dr. M. A. Howe. The lectures were followed by demonstrations from the living plants.

The following visiting botanists have recently registered in the library: Professor John W. Harshberger, Philadelphia, Pa.; Dr. J. N. Rose and Mr. C. L. Shear, Washington, D. C.; Mr. Mel T. Cook, New Brunswick, N. J.; Mr. C. Billington, Detroit, Mich.; Professor M. Kanda, Hiroshima, Japan; and Dr. E. A. Gaumann, Bienne, Switzerland.

Dr. Neil E. Stevens, of Washington, D. C., spent two weeks at the Garden in April, engaged in bibliographical work in the library.

Professor Leroy Abrams, of Leland Stanford Jr. University, spent five weeks at the Garden in April and May, engaged in research on the flora of the Pacific coast. Professor Abrams is now preparing an Illustrated Flora of the Pacific States, of which volume one is practically finished.

Construction of new paths, mentioned in the February issue of the Journal, has been continued. The path from the Boulder Bridge through the arboretum to a point near the propagating houses has been completely surfaced with ashes and provides a long-needed connection. Work is now going forward on the path which will ultimately connect the rose-mallow garden with the iris garden.

The annual spring inspection of the Garden was held Thursday afternoon, May 1. The customary tour of the grounds and buildings was interfered with by rain, and the visitors spent most of their time indoors, where short talks were made by Dr. W. Gilman Thompson, Dr. N. L. Britton, and Dr. H. A. Gleason. A special feature of the day was the unveiling of a tablet in the new glass-houses, now approaching completion, at Range 2.

The tablet bears the inscription "This greenhouse was given by Daniel Guggenheim and Murry Guggenheim, 1917-1918, The New York Botanical Garden."

Among recent additions to the herbarium are a valuable collection of specimens from California and neighboring states, collected by Miss Alice Eastwood, curator of the California Academy of Sciences, and sent in exchange from that institution, and an interesting series of the earlier collections of Mr. John Macoun from Canada.

Mrs. E. G. Britton has given two of the Stokes' Wild Flower Preservation lectures, one before the Garden Club of Trenton, New Jersey, as the guest of Mrs. Karl Roebling, on April 3, and the other at the Larchmont Garden Club on April 7. The New Rochelle Garden Club made a special request for a lecture on the New York Botanical Garden, and Miss Kittredge prepared for it some new colored slides of Professor Anderson's exploded grains, which were discovered in the Garden laboratories.

On the afternoon of Wednesday, April 23, after a succession of warm sunny days, the lakes north of the Museum building were most attractive. Willows, poplars and sugar maples gave here and there a brilliant bright-green note to the brown woods; birches dangled their long catkins in the breeze; the high-bush blueberries cast red reflections in the water; cat-tails and sweet flags were pushing out of the mud; lilies had just reached the surface and were beginning to unfold their coppery red leaves. In the tall sweet-gums and button-woods the red-winged blackbird was calling its shrill trilling note; kingfishers noisily chased each other up and down the river; a muskrat sat up on the bank nibbling some fresh green plants; and a small blue-gray heron sat calmly on a branch sound asleep, evidently resting after a long journey. Flycatchers and warblers darted about, and in quiet secluded corners the chewinks and thrushes were foraging. High up in the top of an ash, that melodious songster, the brown thrasher, was softly practising his repertoire, getting ready for

the arrival of his mate, and the swallows were skimming the lake. But best of all, five wood ducks were seen calmly feeding and swimming about a short distance from the paths. The white markings of the head and the crest of the males were plainly visible.

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OF

The New York Botanical Garden

EDITOR

H. A. GLEASON*First Assistant*

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BRACKENRIDGE AND HIS BOOK ON FERNS

William D. Brackenridge was born at Ayr, Scotland, June 10, 1810. In his youth he was trained as a gardener, and was in charge of Dr. Patrick Neill's grounds at Canonmills, Edinburgh. He then spent several years on the Continent, part of the time on an estate in Poland and the rest studying under Garden-director Friedrich Otto at Berlin. His knowledge of the German language, acquired during these years, proved of much value to him in his later travels. About 1837 he came to America, and entered the employ of Robert Buist of Philadelphia, the famous nurseryman. In 1838 a great opportunity presented itself to collect and study plants in fields rarely visited by the botanist, and he seems to have seized it with avidity.

For several years the United States government had been planning to send out a scientific expedition for the exploration of the Pacific. The plans were at first rather chaotic, and there were changes in commanders, alterations in the personnel of the scientific staff, and delays in the selection of vessels and the collection of supplies. As early as the summer of 1836, Asa Gray was slated as botanist of the expedition, and William Rich as assistant botanist. Nearly all arrangements for sailing had been completed in November, 1837, when the commander, Captain Jones, was taken sick. In the following year the command was transferred to Charles Wilkes, who entirely reorganized the work and conducted it in a masterful way until its completion. In July, 1838, Gray tendered his resignation, which was

accepted several weeks later; Rich was advanced to the post of botanist, and almost on the eve of sailing Brackenridge was designated as horticulturist and assistant botanist.

As finally made up, the fleet of the United States Exploring Expedition comprised six sailing vessels: two sloops-of-war, a store-ship, a gun-brig, and two tenders. During the voyage of nearly four years, two were lost, one was sent home, and one sold, only two of the six making the entire trip. Twelve civilians constituted the scientific corps. Three of these were particularly interested in botany, and devoted their time chiefly to the collection and study of plants. These three were Charles Pickering, one of the two "naturalists," William Rich, "botanist," and Brackenridge, who is sometimes styled "assistant botanist" and sometimes "horticulturist."

The different vessels of the expedition did not always keep together; indeed, sometimes one of them made a voyage under special orders to some part of the Pacific never visited by the rest, so that it is impossible to trace the track of the "expedition" as a whole. Most of the members of the scientific corps, however, were attached to the Vincennes, which was the largest vessel and the flag-ship of the little fleet; Rich, with one of the artists, Alfred T. Agate, who was particularly engaged in making drawings of living plants, spent the first year with the store-ship Relief.

The expedition finally, sailing from Hampton Roads, left the shores of the United States August 19, 1838, Brackenridge being with Pickering on board the Vincennes. Crossing the Atlantic, the first stop was one of about a week at Madeira, where Brackenridge did his first collecting. Recrossing the Atlantic to Rio de Janeiro, the Vincennes lay at anchor in the harbor there for about six weeks; during this time Brackenridge was able to devote considerable time to the study of the peculiar flora of the Organ Mountains. Leaving Rio on the seventh of January, 1839, the Vincennes proceeded southward along the coast, anchoring for about a week off the mouth of the Rio Negro, where several landing parties visited the shore, and finally doubling Cape Horn, in exceptionally fine weather, on the sixteenth of

February. Just after passing the Cape, the Vincennes anchored in Orange Harbor, and here Pickering and Brackenridge transferred to the Relief, where Rich already had his quarters.

The Relief left Orange Harbor February 26, 1839, sailing slowly up the Chilean coast, but not effecting a landing until arrival at Valparaiso, April 15. During the two weeks' stay at this port, Brackenridge collected along the coast north of the city, and as far inland as Santiago. Leaving Valparaiso on the first day of May, the Relief arrived at Callao on the twelfth. During the latter half of the month, a considerable party, including Pickering, Rich, and Brackenridge, penetrated the interior to and a short distance beyond the divide. All of June and a part of July was spent in the vicinity of Lima.

The Vincennes, to which Pickering and Brackenridge had again transferred themselves (Rich changing to the other sloop-of-war, the Peacock, as the Relief returned home from Callao), sailed westward, out into the Pacific, from Callao, July 13, 1839. Her course lay through the Low Archipelago to Tahiti and thence past Bellinghausen and Rose islands to the Samoan group, sending out parties to the shore at various islands on the way. Nearly three weeks in September were spent in the Tahitian group, and a month, from October 8 to November 10, among the Samoan Islands, upon several of which Brackenridge collected plants. From Samoa, the Vincennes sailed westward, then southward between the Fiji Islands and New Caledonia, and arrived at Sydney, New South Wales, about the end of November, 1839.

The day after Christmas the Vincennes left Sydney for the cruise during which the Antarctic continent was discovered, and, returning to Sydney, sailed thence to the Bay of Islands, near the northern end of New Zealand, and northward to the Fiji Islands. Some three months were spent in this group, from early May until nearly the middle of August; Brackenridge collected on several of the islands. Leaving Fiji and sailing northward through the Phoenix Islands, over a very zigzag course due largely to uncertain weather conditions, the Vincennes came in sight of the Hawaiian Islands on the 20th of September, and on the 24th cast anchor in the harbor of Honolulu. It was more

than six months later, April 6, 1841, that the Vincennes left Hawaii for the northwest coast of America, and these islands supplied a rich harvest to the botanists of the expedition.

The expedition arrived off the bar at the mouth of the Columbia River late in April, 1841, and proceeded north along the coast, entering Puget Sound about two weeks later, and this remained the headquarters for several months. Brackenridge, with Pickering, accompanied a party into the interior, under the command of Lieut. Johnson. This party proceeded in a general easterly direction across what is now the center of the state of Washington as far as Lapwai in Idaho, and returned by a more southern route, through Walla Walla, up the Yakima River, and over the mountains to the headquarters at Fort Nesqually. Upon the return of this party, Brackenridge accompanied Mr. Eld on his survey of Gray's Harbor, going down the Chehalis River. The trip into the interior and that to Gray's Harbor, each of about six weeks' duration, occupied the entire summer; and early in September Brackenridge, with Rich and several other members of the scientific corps, joined Lieut. Emmons' overland party to San Francisco, while the squadron sailed down the coast to the same place. The overland party went up the Willamette River, and through the Umpqua and Shasta regions to the headwaters of the Sacramento River, which was followed to its mouth. It was on this trip, near Mt. Shasta, that Brackenridge, who had dropped behind the rest of the party and was hurrying to rejoin them, hastily gathered an odd-looking plant that had attracted his attention. It was the fifth of October (1841, not 1842 as has been stated erroneously in all accounts of the discovery of this plant), and the season for flowers was long past, but the specimen was sufficient to show evident relationship to the group of pitcher-plants known, then and now, only from east of the Rocky Mountains. Not until nearly ten years later, in May, 1851, was this California pitcher-plant collected, in the same vicinity, in flower, so that it was possible to give a correct scientific description of the genus *Darlingtonia*, or, as it is now known, *Chrysamphora*.

The members of the scientific corps were finally all re-united

on board the *Vincennes* in San Francisco bay (the other sloop-of-war, the *Peacock*, had been wrecked during July in the Puget Sound region), and the expedition set sail again on the first day of November, 1841. The route lay westward across the Pacific, with a stop of about a week in Hawaii, through the Ladrões to the Philippines. While the *Vincennes* was at Manila, from the 13th to the 21st of January, 1842, the naturalists were often on shore, and Rich and Brackenridge were members of a party that set out to visit Taal volcano, then in eruption, but they failed to reach their destination.

From Manila, the *Vincennes* sailed by way of the Sulu Archipelago to Singapore, the Cape of Good Hope, the island of St. Helena, and home, arriving at New York on the ninth of June, 1842, nearly four years after the departure from the coast of Virginia. The expedition had accumulated vast collections in various departments of natural history, but the government had made no adequate provision for their care. For a few years they were intrusted to the National Institute, in Washington, then transferred to the Patent Office, and finally to the Smithsonian Institution, forming the nucleus of the National Museum of today. In a preliminary summary of the results of the expedition published shortly after its return, it is stated that about ten thousand species of plants were collected, from three to five specimens of each, and that about one hundred living plants and many seeds were brought back safely.

The organization of the Exploring Expedition was maintained for many years, with Wilkes still in charge, while the results of the cruise were being prepared for publication. The Library Committee of Congress was placed in charge of the publication of the results. To Brackenridge was assigned the preparation of the manuscript relating to ferns, but he was also in charge of the collections of living plants and seeds, and this horticultural work occupied so much of his time that he had little left for literary effort.

The first season, Brackenridge had at his disposal a greenhouse erected for the purpose on the lot behind the Patent Office; the building was about 50 feet long, partitioned into two apartments.

He reported that he had in cultivation about 500 species, not counting seedlings, and that 254 species of living plants had been brought home by the expedition. During 1843 and 1844 the greenhouse was enlarged to at least three times its original size. The living plant collections remained here until 1850, when the erection of a new wing of the Patent Office necessitated their removal, and new conservatories were erected on the Mall, immediately in front of the Capitol. Brackenridge remained in charge of these new greenhouses as long as they remained under the supervision of Captain Wilkes; that is, until the summer of 1854.

The publication of the volumes containing reports of the results of the expedition was planned on a magnificent scale, carried out in a desultory fashion, and seriously interrupted by the civil war. Finally, in 1876, although still far from completion, publication was definitely suspended; this was due chiefly to the reckless manner in which appropriations had been squandered, comparatively little of the money being used for the purpose for which it was intended. Each volume was issued by the government in an edition of 100 copies, sumptuously bound, and distributed gratuitously to the state libraries of each state of the Union and to the national libraries of certain foreign countries. No copies of this government edition were offered for sale to the public, but each author was permitted to have additional copies printed at his own expense, and to sell or give them away at his own discretion.

Brackenridge was a good field-botanist, with the advantage of four years of intimate association during the voyage with the scholarly Pickering; and he was by no means illiterate. That he could write English clearly and fluently is proven by his letters still in existence. But he was not well versed in the technical forms of descriptive plant taxonomy, and his knowledge of Latin was very limited. The rules laid down for the monographs of the report series demanded that every description should be printed in both Latin and English, and Brackenridge appealed to Professor John Torrey, of Princeton, to help him out of his difficulty. Torrey revised much of the fern manuscript, supply-

ing Latin translations as he went along; for some unexplained reason, however, Wilkes required Brackenridge to demand the return of the manuscript in July, 1851, and subsequently it was placed in the hands of Dr. Asa Gray, who completed the preparation of the work for the press. From his letter of December 7, 1853, to Engelmann, one would suppose that Gray was responsible for all that there is of value in Brackenridge's masterpiece, but this is certainly far from true. Even the Latin translations were not all Gray's work; unless, indeed, Torrey's notes were not made available to him, and he was compelled to do all of his work without their assistance.

Brackenridge's report on "Filices, including Lycopodiaceae and Hydropterides," constituting vol. 16 of the expedition series, after many vexatious delays, at last made its appearance. It was issued in two parts, a quarto volume of text, dated 1854, and a folio volume of plates, dated 1855. Early in 1856, a fire in Washington destroyed about one fifth of the sets of the government edition published up to that time, including the volumes dealing with ferns. It is not known exactly how many copies Brackenridge had printed for his own use; but it matters little, for at about the same time that the government supply was so seriously reduced, his own was wiped out by a fire in Philadelphia, after only ten copies had been sold, most of these to customers in Europe. It is no wonder then, as is well known, that the Brackenridge volumes are the scarcest in the Exploring Expedition set. The New York Public Library contains a copy of the text; but the folio atlas, with its 46 beautiful plates, seems to be even rarer, and was not to be found in any of the great libraries of New York City, until a copy was recently secured by purchase for the library of the New York Botanical Garden.

In the spring of 1855, Brackenridge purchased a tract of 30 acres near Baltimore, Maryland, with buildings, and here he spent the remainder of his life. As nurseryman and landscape architect he took an important part in the development of many beautiful estates in the vicinity of Baltimore. For some years he was horticultural editor of the *American Farmer* but his one book was his only contribution of importance to botanical literature. His death occurred on the third of February, 1893.

Brackenridge's modesty was so excessive that he could never be induced to furnish biographical information to those who sought to secure it directly from him as the most authoritative source, and the world is indebted to the late Thomas Meehan for the preservation of not a few of the facts of this interesting career. Meehan published an account of Brackenridge, with a portrait, in the number of his *Gardeners' Monthly* for December, 1884, and recorded his death in the number of *Meehan's Monthly* for March, 1893. Some interesting references to Brackenridge's activities during his residence in Washington during the years 1842-55 may be found in Rathbun's account of the Columbian Institute, in Bulletin 101 of the United States National Museum. An extended discussion of the publications of the Wilkes Expedition, by F. S. Collins, appeared in *Rhodora* for April, 1912. The published narrative of the expedition enables one to trace Brackenridge's movements, more or less accurately, during the cruise; but, for the earlier part of the voyage, the second volume of Pickering's "Geographical distribution of animals and plants" is even more valuable, as Brackenridge was with Pickering on ship-board, and accompanied him on nearly every trip ashore. It is from these sources, occasional scattered notes elsewhere, and the letters written by Brackenridge to Torrey and now preserved in the library of the New York Botanical Garden, that the present account has been prepared.

JOHN HENDLEY BARNHART.

THE COMPETITION IN DECORATIVE DESIGN

In order to continue the interest in the use of American plants in design, aroused by the recent exhibit at the Metropolitan Museum of Art, and described in the April issue of the JOURNAL, a competition for art students was held during the month of April. The following preliminary circular was issued:

AMERICAN WILD FLOWERS IN DECORATIVE DESIGN

Prizes for competitive designs for printed textiles, of four typical East American early-blooming wild flowers, are offered jointly

by the Metropolitan Museum of Art and by the New York Botanical Garden, supplementary to the exhibition of the Use of Plants in Decorative Design now in progress at the Museum.

The plants selected are:

1. Spring Beauty.
2. Dutchman's Breeches.
3. Rue Anemone.
4. Bloodroot.

The competition is open to all art students.

Competitors must report on afternoons to be designated, at three o'clock, at the Mansion, New York Botanical Garden, Bronx Park, when notified that the plants are in flower, and bring their material with them. They will be shown the plants growing, and specimens will be brought to the Mansion for designing.

It is expected that the plants will flower this year during the period between April 12 and April 25, depending on the advance of spring. Each competitor will submit four designs, one based on each of the four plants selected. The designs may be carried out:

- a. With paint on paper, or
- b. In the form of hand-decorated textiles, or block-printed textiles, batik, etc.

Intending competitors must write to the Director-in-Chief, New York Botanical Garden, giving their names, addresses, and the schools in which they are students, not later than April 17.

Two first prizes of \$50 each, two second prizes of \$25 each, two third prizes of \$15 each, and two fourth prizes of \$10 each will be awarded by a joint committee of the two institutions, and announced.

The object of the competition is to encourage the use of American wild flowers in decorative design.

Notwithstanding the haste with which preparations were necessarily made, since the plants were rapidly coming into bloom, over thirty competitors registered in response to this announcement, while twenty-six submitted designs and evinced the keenest interest throughout. The first meeting was held at the Mansion, Saturday, April 19, and all the work was done there. Experience soon showed that the time originally allotted for the contest was insufficient, and the Mansion was accordingly

opened to the competitors for eight days, and the finished designs were submitted on Monday, April 28.

Mr. H. F. Kent, secretary of the Metropolitan Museum of Art, appointed as judges Miss Abbot, of the Metropolitan Museum, Mrs. Britton, of the Garden, and Miss Cornell, of Teachers' College, Columbia University. Since in the opinion of the judges none of the designs was worthy of a first prize, only six prizes were awarded, which were distributed as follows:

Second prizes of \$25 each: Marjory F. King, Katherine S. Lamb.

Third prizes of \$15 each: Ethelyn C. Stewart, Dorothy Asbury.

Fourth prizes of \$10 each: Amy Stevenson, G. Marie Le Prince.

Through the generosity of a friend of the Garden, prizes of five dollars each were awarded to each of the other competitors who submitted designs.

H. A. GLEASON.

COMPLIMENTARY DINNER TO DR. BRITTON

The Board of Managers of the New York Botanical Garden gave a dinner to Dr. N. L. Britton at the Metropolitan Club, May 7, the guests including the Scientific Directors of the Garden and a number of other distinguished scientists. Dr. D. T. MacDougal, of the Carnegie Institution of Washington, formerly Director of the Laboratories at the Garden, acted as toastmaster. The speakers included Dr. Arthur Hollick, who mentioned Dr. Britton's early botanical work on Staten Island; Dr. Henry Fairfield Osborne, on Dr. Britton's part in the development of science in New York; Provost W. H. Carpenter, on his relation to Columbia University; Professor Robert A. Harper, on his relation to botanical research; and Dr. George T. Moore and Dr. C. Stuart Gager, who brought greetings from the Missouri Botanical Garden, of St. Louis, and the Brooklyn Botanic Garden. Dr. Lewis R. Morris read letters of appreciation from several who were unable to attend. At the close of the dinner, following a congratulatory address by Mr. Robert W. De Forest, a huge specimen of *Echinocactus* was unveiled, symbolic of Dr.

Britton's recent monographic studies on Cactaceae, within which was concealed a handsome loving cup, bearing the inscription:

TO
NATHANIEL LORD BRITTON, Sc.D., L.L.D.
FROM
THE MANAGERS OF
THE NEW YORK BOTANICAL GARDEN
IN RECOGNITION OF
HIS DISTINGUISHED SERVICE
TO
THE GARDEN, PUBLIC EDUCATION AND SCIENCE
1896-1919

Dr. W. Gilman Thompson, president of the Board of Managers, announced that the dinner was not in celebration of any event or anniversary, but was given as a token of the good will, the esteem, and the confidence of the Board of Managers.

H. A. GLEASON.

THE DIGGER PINE IN THE BOTANICAL GARDEN

In the pinetum there have been for several years two specimens of the digger pine, *Pinus Sabiniana*. One of these was secured by exchange with the Department of Parks, Borough of The Bronx, in 1900, and was located on the southern side of the knoll to the east of Conservatory Range 1, in a protected place but in a rather dry situation. This specimen died during the past winter. The other was raised from seed secured by Dr. F. E. Lloyd in 1898. It was transferred to the pinetum in May, 1906, to a position more wind-swept than that occupied by the other specimen but more favorable in its moisture conditions. This, still in good condition, is located just to the southeast of the fountain enclosure at the foot of the Museum approach. This pine is seldom seen in cultivation and is one of the rarest specimens in the pinetum.

The digger pine is native in western California on dry foothills, singly or in small groups, ranging through altitudes from 500 to 4,000 feet; it is most abundant, however, and attains its greatest size on the sun-baked slopes in the middle of the state. It reaches a height usually of 40 to 50 feet, although it is sometimes larger than this. The Indians of California found in its sweet seed a valuable article of food. The digger pine was discovered in 1831 by David Douglas on the mountains near Monterey and was introduced the following year by its discoverer into Europe, where it was first cultivated in the garden of the Horticultural Society of London at Chiswick. It is named in honor of Joseph Sabine, at that time secretary of the Horticultural Society.

GEORGE V. NASH.

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Tilia Oliveri. OLIVER'S LINDEN.

Location: Arboretum.

Natural distribution: Central China.

Tilia platyphyllos. LARGE-LEAVED LIME.

Location: Arboretum.

Natural distribution: Europe.

Tilia platyphyllos var. Beaumonti pendula. BEAUMONT'S WEEP-
ING LARGE-LEAVED LIME.

Location: Arboretum.

Tilia platyphyllos var. corallina. RED-TWIGGED LIME.

Location: Arboretum.

Tilia platyphyllos var. laciniata. CUT-LEAVED LIME.

Location: Arboretum.

Tilia tomentosa. WHITE LINDEN.

Location: Arboretum.

Natural distribution: Eastern Europe and Asia Minor.

Tilia tomentosa var. petiolaris. WEEPING WHITE LINDEN.

Location: Arboretum.

Grewia. GREWIA**Grewia parviflora.** SMALL-FLOWERED GREWIA.

Location: Fruticetum.

Natural distribution: Northern China to Korea.

MALVACEAE. Mallow Family

Hibiscus. HIBISCUS**Hibiscus syriacus.** ROSE-OF-SHARON.

Location: Fruticetum.

Natural distribution: Asia.

Hibiscus syriacus var. **Jeanne d'Arc.** JEANNE D'ARC ROSE-OF-SHARON.

Location: Fruticetum.

DILLENIACEAE. Chalta Family

Actinidia. ACTINIDIA**Actinidia arguta.** SHARP-TOOTHED ACTINIDIA.

Location: Viticetum.

Natural distribution: Japan, Corea, and Manchuria.

Actinidia chinensis. CHINESE ACTINIDIA.

Location: Nursery enclosure.

Natural distribution: China.

THEACEAE. Tea Family

Stewartia. STEWARTIA**Stewartia pentagyna.** MOUNTAIN STEWARTIA.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Stewartia Pseudocamellia. JAPANESE STEWARTIA.

Location: Fruticetum.

Natural distribution: Japan.

HYPERICACEAE. St. John's-wort Family

Hypericum. ST. JOHN'S-WORT**Hypericum aureum.** GOLDEN ST. JOHN'S-WORT.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Hypericum galioides. BEDSTRAW ST. JOHN'S-WORT.

Location: Fruticetum.

Natural distribution: Southern United States.

Hypericum hircinum. GOAT ST. JOHN'S-WORT.

Location: Fruticetum.

Natural distribution: Mediterranean Region.

Hypericum Kalmianum. KALM'S ST. JOHN'S-WORT.

Location: Fruticetum.

Natural distribution: Quebec to Wisconsin and Illinois.

Hypericum patulum. SPREADING ST. JOHN'S-WORT.

Location: Fruticetum.

Natural distribution: Japan.

Hypericum patulum var. **Henryi.** HENRY'S SPREADING ST. JOHN'S-WORT.

Location: Fruticetum.

Hypericum prolificum. SHRUBBY ST. JOHN'S-WORT.

Location: Fruticetum.

Natural distribution: Eastern United States.

TAMARICACEAE. Tamarisk Family

Tamarix. TAMARISK

Tamarix odessana. CASPIAN TAMARISK.

Location: Fruticetum.

Natural distribution: Caspian Region.

Tamarix parviflora. SMALL-FLOWERED TAMARISK.

Location: Fruticetum.

Natural distribution: Southern Europe.

Tamarix pentandra. PALLAS' TAMARISK.

Location: Fruticetum.

Natural distribution: Southeastern Europe to Central Asia.

THYMELEACEAE. Mezereon Family

Daphne. DAPHNE

Daphne Cneorum. GARLAND FLOWER.

Location: Fruticetum.

Natural distribution: Central Europe.

Daphne Genkwa. CHINESE DAPHNE.

Location: Fruticetum.

Natural distribution: China.

Dirca. LEATHER-WOOD**Dirca palustris.** LEATHER-WOOD.

Location: Fruticetum.

Natural distribution: Eastern North America.

ELAEAGNACEAE. Oleaster Family

Hippophaë. SEA BUCKTHORN**Hippophaë rhamnoides.** SEA BUCKTHORN.

Location: Fruticetum.

Natural distribution: Europe and Asia.

Lepargyrea. BUFFALO-BERRY**Lepargyrea argentea.** BUFFALO-BERRY.

Location: Fruticetum.

Natural distribution: Central North America.

Elaeagnus. OLEASTER**Elaeagnus angustifolia.** OLEASTER.

Location: Fruticetum.

Natural distribution: Southeastern Europe and western Asia.

Elaeagnus angustifolia var. **orientalis.** ORIENTAL OLEASTER.

Location: Fruticetum.

Elaeagnus commutata. SILVER-BERRY.

Location: Fruticetum.

Natural distribution: Northern North America.

Elaeagnus multiflora. GOUMI.

Location: Fruticetum.

Natural distribution: Japan and China.

Elaeagnus umbellata. UMBELLED OLEASTER.

Location: Fruticetum.

Natural distribution: Japan.

ARALIACEAE. Ginseng Family

Hedera. IVY**Hedera Helix.** ENGLISH IVY.

Location: Wall at approach to elevated railway.

Natural distribution: Europe, Canaries, Northern Africa, and Asia.

Acanthopanax. ACANTHOPANAX**Acanthopanax Maximowiczii.** MAXIMOWICZ'S ACANTHOPANAX.

Location: Arboretum.

Natural distribution: Japan.

Acanthopanax pentaphyllum. FIVE-LEAVED ACANTHOPANAX.

Location: Fruticetum.

Natural distribution: Japan.

NOTES, NEWS AND COMMENT

Dr. Stewardson Brown, curator of the Herbarium of the Philadelphia Academy of Sciences, spent a week at the Garden in May.

Mrs. Maud L. Johnston is the first woman to register for the course in gardening, which has been in progress at the Garden since January.

Bulletin of the New York Botanical Garden number 37, with 87 pages, was issued May 12, 1919. It contains the annual reports of the director-in-chief and other officers for the year 1918.

Mrs. E. G. Britton spoke before the Plainfield Garden Club on May 14 and the Rumson Garden Club on May 20, on the subject "Rare plants hardy in the New York Botanical Garden," accompanying her remarks by a demonstration of the plants.

Professor H. M. Fitzpatrick, of Cornell University, recently spent several days at the Garden consulting material for the

completion of his monograph on the Coryneliaceae, a group of parasitic fungi which occur mainly in the tropics.

Volume 24, part 1, of *North American Flora*, was issued April 25, 1919. It comprises a part of the tribe Psoraleae of the family Fabaceae, by Dr. P. A. Rydberg, curator at the Garden; the genus *Eysenhardtia* by Dr. Francis W. Pennell, associate curator.

Dr. W. A. Murrill, supervisor of public instruction, addressed the North Country Garden Club, at Westbury, Long Island, on May 28 on "Trees," and followed his lecture by an inspection of the trees on the grounds of his hostess, Mrs. Beekman Winthrop.

Meteorology for April.—The total precipitation for the month was 2.80 inches. The maximum temperatures for each week were 65° on the 4th, 70° on the 8th, 68° on the 19th, and 71° on the 27th. The minimum temperatures were 38° on the 14th, 36° on the 19th, 28° on the 25th, and 37° on the 30th.

Mr. Marshall O. Howe, of Brattleboro, Vermont, died May 13, aged 86 years. Mr. Howe had long been interested in the local flora of his region, and was the father of two well-known botanists, Dr. Clifton D. Howe, of the University of Toronto, and Dr. Marshall A. Howe, curator of algae at the Garden.

Dr. Francis W. Pennell, associate curator at the Garden, addressed the Botanical Society of Pennsylvania at the University of Pennsylvania, Philadelphia, April 28, describing his botanical exploration of the eastern Andes of Colombia. On May 3 Dr. Pennell spoke on "The wild flowers of spring" to the boys of the Loomis Institute, Windsor, Conn.

An ornithological event of unusual interest in the Garden was the nesting of a Black Duck. A representative of the American Museum of Natural History verified the identification and

photographed the bird on the nest. Although the nest was placed in an exposed position at the base of a tree, not more than thirty feet from a foot-path, the brood was hatched successfully.

The following scientists have recently registered in the library: Dr. J. Chester Bradley, Ithaca, N. Y., Dr. E. W. Brandes, Washington, D. C., Dr. Mel T. Cook, New Brunswick, N. J., Dr. Alexander W. Evans, New Haven, Conn., Dr. J. N. Rose, Washington, D. C., Mr. Camillo Schneider, Jamaica Plain, Mass., Prof. James W. Toumey, New Haven, Conn., and Dr. H. H. Whetzel, Ithaca, N. Y.

A joint meeting of the Torrey Botanical Club and the Wild Flower Preservation Society of America was held at the Mansion, May 15, with Mrs. E. G. Britton as hostess. Short talks were made by Mr. Sereno Stetson on the relation of the Boy Scout movement to wild flower preservation and by Mr. H. M. Denslow on the native orchids. The address of the day was delivered by Mr. Stewardson Brown, of Philadelphia, on the native wild flowers of Pennsylvania, including those of the pine barrens of New Jersey, and was illustrated by colored slides taken from original photographs by the speaker.

The monograph of the Cactus Family, upon which Dr. Britton has been at work for several years in coöperation with Dr. J. N. Rose, of the United States National Museum, for publication by the Carnegie Institution of Washington, is approaching completion. Dr. Rose spent portions of April and May at the Garden for this investigation. The work will be issued in four quarto volumes, freely illustrated by colored plates and by reproductions of photographs and line drawings. The first volume, in completed page proofs, was turned in for printing in May; the second volume, for which illustrations have been made, is all ready for the printer; the third volume is nearly completed in manuscript, and much work has been done upon the fourth.

Vol. XX

July, 1919

No. 235

JOURNAL
OF
The New York Botanical Garden

EDITOR

H. A. GLEASON

First Assistant



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The Bagworm or Basket-worm

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THE BAGWORM OR BASKET-WORM

(WITH PLATE 232)

One of the biting insects which is responsible for a great deal of damage to trees and shrubs both in parks and in private grounds is the insect which is indicated by the title of this paper. The characteristic habits of the insect have given to it the very suggestive name which it bears. During the process of feeding the worm spins about itself a bag or basket which is carried about with it during the entire feeding stage. The bag is composed of silk together with bits of leaves or minute twigs from the plant on which the insects happens to be feeding. These are woven together in such a way as to obscure the caterpillar within and present a very ragged and unkempt appearance. Whether the bits of leaves and other debris are used to strengthen the bag or are employed as a deceptive device to render the insect less conspicuous is a question which the reader is at liberty to answer for himself.

While feeding, the head of the worm can be seen protruding from the mouth of the bag, which is carried by the caterpillar while it clings to the plant with its three pairs of strong legs. When disturbed or while at rest the bag is suspended from a twig by a mass of silk threads which are wound about the twig like a sheath, the caterpillar then being entirely concealed within.

Unlike many of our troublesome insect pests, the bagworm is undoubtedly a native of this country, being found in the eastern half of the United States as far north as Massachusetts and as

far south as Texas, but is less evident or absent in the other Gulf states. In many of the states this insect causes a great amount of damage.

The bagworm is almost an omnivorous feeder, attacking all kinds of deciduous trees and shrubs, and also seems to be very fond of conifers of various kinds. The caterpillars seem to be entirely oblivious of either taste or smell, attacking trees whose foliage would naturally seem to be repulsive, such trees as the sassafras having been found on our grounds almost entirely defoliated by them. While also especially fond of evergreens they show some preference for the arbor-vitae. Where the insect gains the upper hand before being detected these trees may be almost entirely defoliated by them in a short time. They do not as a rule feed on herbaceous plants, although they have been known to do so in the absence of other suitable foods. While at times they seem to be rather selective in their habits, they nevertheless appear to be able to adapt themselves readily to almost any kind of green plant food.

The eggs of the female are deposited in the bag, which is suspended to a twig where it remains over winter. Late in the spring the caterpillars hatch, leave the old nest, and attack the nearest leaf. There they begin to feed and to construct a bag of silk and debris. While the larva is small the case is carried upright, but as it becomes larger it is allowed to hang down. The caterpillar molts four times before it reaches maturity. During the process of molting the bag is attached to a twig by means of silk fastening. At the bottom of the bag is a small opening through which the old skin and excrement are pushed out of the nest.

Toward midsummer the caterpillar attaches the bag to a twig and lines it with another layer of silk and the bag now becomes its cocoon. The pupal stage lasts about three weeks, at the end of which time the adult appears. The male works its way through the bottom of the bag and the winged adult moth makes its escape.

The female moth is wingless and legless and never leaves the cocoon, but merely emerges far enough to permit mating. She

then deposits her eggs in the bag and in a short time emerges a second time from the cocoon, dies, and falls to the ground. The eggs remain in the bag until time to hatch the following spring.

Since the eggs are deposited in the bags and remain there during the winter, one of the best means of controlling the insect is to collect and burn the female bags before time for the young caterpillars to emerge in the spring. This is not a difficult matter, especially on deciduous trees, since the bags are very conspicuous in the winter after the leaves have fallen. When we take into consideration the fact that for each female bag burned a large number of eggs have been destroyed which would otherwise have developed into active caterpillars in the spring, we can appreciate the value of this means of control. Hand picking in the summer time is also quite effective and practical especially on small evergreens and shrubs. Even on large trees a great deal can be accomplished along this line by the use of a long-handled pruning hook.

If the hand picking has been neglected or the insects are too numerous to be handled by this means, the caterpillar, being a leaf-feeder, can be checked by the use of a stomach poison sprayed or dusted on in the usual manner. If hand picking has been persistently practiced spraying will seldom be necessary for this insect. During the present spring a careful search of a large number of small evergreens revealed only a half dozen bags and all of these were on arbor-vitae. Of course some were doubtless overlooked. Hand picking has been claimed to be ineffective for evergreens because of the difficulty of locating the bags, but in our own grounds it has been found quite effective.

Like most destructive insects the bagworm has a large number of natural enemies, although on account of their protection they are not easily taken by birds. Their most effective natural enemies consist of other kinds of insects. One objection to the burning of the bags which have been gathered is the fact that in destroying the bagworm eggs we also destroy a large number of parasites, which if allowed to emerge would be decidedly beneficial in holding the harmful insect in check. As a safeguard against this the bags can be placed in a barrel or other

receptacle with a screen over the top which will allow the parasites to escape. Or, if the bags are piled some distance from available food supply, the parasites will be allowed to escape and the young bagworm, since it possesses limited powers of locomotion, will die before being able to reach suitable food plants.

Since in the control of most insects we are largely dependent upon the enemies provided by nature it is quite advisable that we should do all in our power to know and encourage these enemies. Probably the occurrence of frequent epidemics of harmful insects is due very largely to the suppression of their natural enemies and with the reoccurrence of these the epidemic subsides. Very often the favorable results which we attribute to our own efforts are mainly due to the interference of nature. This, however, should not serve to discourage the application of artificial remedies, but should make us cautious in taking too much credit to ourselves for the results which follow.

FRED J. SEAVER.

THE RE-DISCOVERY OF *FISSIDENS DONNELLII* AUSTIN

(WITH PLATE 233)

It gives me much pleasure to be able to contribute some additional information on one of our rarest species of mosses, especially since the ninetieth birthday of Capt. John Donnell Smith, for whom the species was named, was celebrated June 5 by all American botanists, who have gladly acknowledged their indebtedness to his zeal and inspiration.

Fissidens Donnellii has at last been found in fruit by Mr. Severin Rapp, of Sanford, Florida, to whose systematic search we owe so many interesting Bryophytes. Austin's original specimens bore setae, but were without capsules and were collected at Caloosa in 1878; Mr. Rapp's specimens are in good fruit and extend the range of the species nearly 130 miles farther north. They have enabled me to compare critically this species with its tropical allies, to reduce to synonymy a Mexican and a

Brazilian species, and to greatly extend its range. Strangely enough, West Indian specimens are still lacking.

FISSIDENS DONNELLII Aust. Bot. Gaz. 4: 151. 1879

Fissidens tenerrimus C. Muell. Act. Soc. Sc. Fenn. 19: 10. 1891.

Fissidens crenato-serrulatus Card. Rev. Bryol. 36: 70. 1909.

Plants minute and decumbent, growing at the base of trees only in tropical or subtropical regions: sterile stems 2-3 mm. high with 6 or 7 pairs of leaves, the uppermost smaller than those of the fruiting plants, only 1 mm. long by 0.16 mm. wide, spreading; fertile stems 2-4 mm. high, often arising as basal offshoots from old decumbent sterile plants; leaves more or less secund when dry, usually few, only 3-5 pairs, very unequal in size, the uppermost or perichaetial leaves 1.5 mm. long by 0.25 mm. wide, expanded at base, incurved, falcate, and usually one of the leaves narrower and contracted below the junction of the duplicate blades; margins not bordered, sharply and regularly crenate-serrate, cells larger and not papillose: duplicate blades unequal, narrowed at one side to the costa, sometimes contracted at the junction; costa ending below the acute apex, pellucid, crenulate in cross-section, with 3 large central ducts and 2 narrow stereid bands; cells sharply mamilllose, each with a large central papilla



Drawings from Austin's type.
 × 270.
 1. Cross-section of apical part of leaf.
 2. Cross-section of basal part of leaf.

on both surfaces, except the inner face of the duplicate blades, those of the apical blade 8-13 μ in diameter, irregularly hexagonal, in cross-section thicker than wide; cells of duplicate blade very irregular in shape and size, up to 18 μ , next the vein; the margins coarsely and unequally toothed. Synoicous, the antheridia terminal on small basal plants, usually few, 2 or 3 mixed with the archegonia and without paraphyses. Seta erect or bent at base, 2-3 mm. long; capsule erect and symmetric, small, only 0.66-0.75 mm. long, with a lid which equals the urn and has a long straight or curved beak; calyptra covering only the beak; walls not thickened, of clear oblong cells up to 27 μ long;

mouth and base of lid bordered with smaller denser cells; neck with a few large stomata; peristome bright-red, spreading when dry, strongly incurved when moist; teeth about $120\ \mu$ long, divided $2/3$ their length, spiral at apex, trabeculate and slightly ciliate on the inner surface with projecting dorsal joints at base; spores green, smooth, $13\text{--}21\ \mu$, maturing in summer.

Habitat and type locality: At base of cypress trees, Caloosa, Florida (*John Donnell Smith and C. F. Austin*, 1878, without capsules).

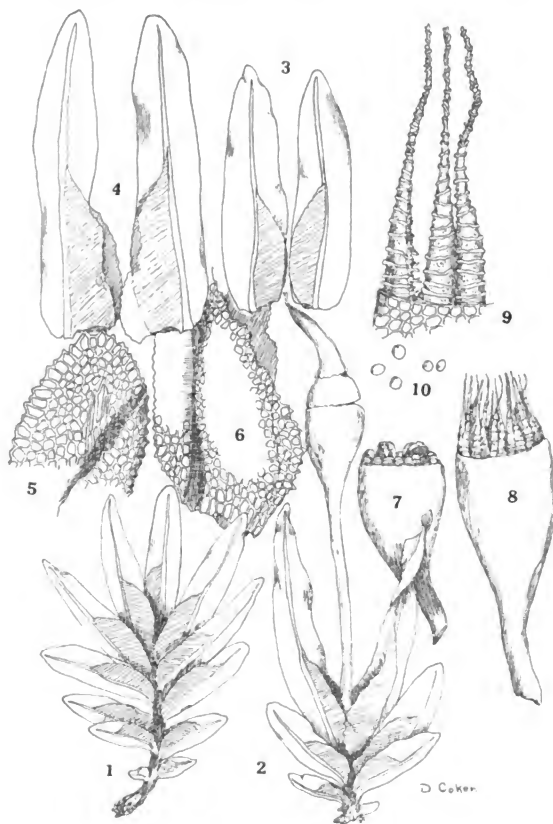
Distribution: Rediscovered at Sanford, Florida, by S. Rapp, 1918; also Mexico (*C. G. Pringle* 15,167, 1908, as *F. crenatoserrulatus* Card.) and Minas Geraes, Brazil (*Wainio*, 1885, sterile, ex. herb. Brotherus, as *F. tenerimus* C. Muell.).

Dr. Charles R. Barnes,* in his Revision of the North American species of *Fissidens*, said of *F. Donnellii*: "This plant has been collected but once, without capsules, and ought probably to be referred to *F. subcrenatus* of Schimper, a Mexican species, from which its known characters differ only by the less number (by one pair) and greater narrowness of the leaves. The larger cells and the distinct serration of the leaves are obvious distinctions from *F. Garberi*, to which it is closely allied."

I cannot agree with these statements: because *F. subcrenatus* Schimp., collected in Mexico by Liebmann in 1843, belongs in the section *Aloma*, where Brotherus has placed it, with the leaf margins almost entire and the cells smooth, not mamilllose; nor is it closely allied to *F. Garberi*, since that belongs in the section *Semilimbidium*, with the basal part of the duplicate blades of the perichaetial leaves bordered and having its leaf cells only $5\text{--}8\ \mu$ in diameter, each with 2-4 small papillae, and the marginal cells either truncate or serrulate. *Fissidens Donnellii* belongs in the section *Crenularia* with sharply toothed leaves, and may possibly be related to, but is not identical with, *F. prionodes* Mont. (1835), if Brotherus is right in referring that species to this section. The drawings in the *Annales*† seem to indicate a leaf with very large papillae, but original specimens from Montagne in Mitten's collection belong to the section *Aloma*, with

* Bot. Gaz. 12: 30. 1887.

† Mont. Ann. Sci. Nat. II. 3: 200. pl. 3, f. 1. 1835.



Fissidens Donnellii Austin

only 4-6 rows of cells on each side of the costa, and figures *b* and *c* may be only a rough attempt to show these cells, instead of being intended for papillae, which would be much exaggerated in size. As no mention is made in the original description of the cells being papillose, and as Mitten's specimens agree in all other respects with the description of type specimens collected by Leprieur in Guiana, it would be natural to suppose that they are typical of this species. Numbers 494-496 of Spruce were also distributed as this species.

Carl Mueller* was responsible for describing this species as papillose ("grossiuscule papillose-areolata"); whether he ever saw type specimens does not appear, though he states that it is "dioicous." I have discovered some confusion and mixture in Montagne's herbarium between two other species, *F. radicans* and *F. guianensis*, and it is just possible that the specimens sent to Mitten may not have been typical, though marked "ex Hb. Montagne," or Mueller may have had a mixture.

F. corticola Schimp.; Besch. (not Montagne) from Guadeloupe has the same prominent mamilllose cells, sharply toothed margins, and great inequality of the duplicate blades; but the costa is percurrent into an apiculate apex, the duplicate blades of the perichaetial leaves are bordered, as in *F. dipلودus* Mitten (1869) and *F. constrictus* C. Muell. (1897), and all of these species are larger, with a greater number of leaves than in *F. Donnellii*. *F. muriculatus* Spruce differs in the smaller (5-8 μ) cells of the leaves and in the peristome, the teeth of which have 2-3 transversely elongated, thick, basal segments and are not spiral at apex.

ELIZABETH G. BRITTON.

DESCRIPTION OF PLATE 233

1. Sterile plant with 6 pairs of leaves.
2. Fertile plant with 3 pairs of leaves, the perichaetial much the longest pair. Seta and capsule erect, calyptra apical.
3. One pair of leaves, showing costa ending below the apex and unequal duplicate blades.
4. Perichaetial leaves, showing the serrate and unequal duplicate blades.
5. Apex of leaf, showing larger, irregularly serrate, marginal cells and profile of dorsal surface with projecting, sharply mamilllose cells.

* Synopsis Muscorum 2: 534. 1851.

6. Basal part of duplicate blade, showing sharp serrations and elongated cells at base.
 7. Capsule with incurved peristome when moist.
 8. Capsule with erect peristome when dry.
 9. Teeth enlarged to show trabeculate and ciliate base and spiral apex.
 10. Smooth spores.
-

CONFERENCE NOTES FOR APRIL

A conference of the scientific staff and registered students of the Garden was held on the afternoon of April 2, at which the following program was presented:

"Further data on the behavior of intermediates between sugar and starch corns," by Professor R. A. Harper.

"Phylogeny within the genus *Afzelia*," by Dr. F. W. Pennell.

Professor Harper exhibited specimens showing the results of crossing sugar and starch corns and illustrating the results of subsequent selection for intermediate races such as he had previously reported as possibly valuable as meal corns. He presented further data as to these races when intercrossed and back-crossed upon the parent races. In both cases they transmit more or less fully their special characters in the new combinations.

Dr. Pennell's report was an account of the trend of evolution in the genus *Afzelia* of the Scrophulariaceae. This group was studied at the University of Pennsylvania, and the detailed results are yet to be published. The work was introduced now because this genus presents a remarkably clear series of stages in the evolution of the flowers.

The most primitive groups are the *Virgatae*, comprising six species that are perennials, and the *Laciniatae*, of one annual species native of southern Mexico. In these the flower approaches closely that normal to this subtribe, the *Agalinanae*. The corolla is campanulate, its lobes shorter than the tube, and it is pubescent within at the base of the upper lobes. The filaments in some species are flattened and ribbon-like through almost their entire length, in others toward the apex they are abruptly contracted and from that point filamentous. The anther-sacs open by an orifice extending their entire length.

Through northern Mexico species occur showing successive modifications in these characters until one finds the following condition in the *Pectinatae* and *Cassioides* of the southeastern United States. The corolla is rotate, its lobes much longer than the tube, glabrous within (irregularly slightly pubescent in *Pectinatae*); the filaments are flattened and pubescent for only a slight portion at the base, and filamentous nearly throughout; the anther-sacs open by slits extending never over one fourth their length, suggesting a terminal pore.

Although they are alike in flower-structure, the differences in the leaves, fruit, and seeds of the *Pectinatae* and *Cassioides* place these in divergent lines of evolution. The intermediate species group themselves on one or the other phylogenetic stem. *Afzelia* illustrates not only progressive evolution, with progressive removal from the geographic point of origin, but exhibits this in two lines of advance and thus affords a remarkable case of parallel evolution.

A. B. STOUT,
Secretary of the Conference.

SUMMER LECTURES, 1919

The following program of public lectures has been announced for the summer of 1919. As usual, they will be held in the lecture hall of the Museum, Saturday afternoons at four o'clock.

June 21. "Edible Wild Mushrooms," by Dr. W. A. Murrill.

June 28. "Some Books on Gardening," by Dr. J. H. Barnhart.

July 5. "Why and How to Spray Plants," by Dr. E. B. Southwick.

July 12. "Dwarf Fruit Trees for Suburban Homes," by Capt. F. A. Waugh.

July 19. "Rose Gardens," by Mr. George V. Nash.

July 26. "Attractive Flowering Plants of New York State," by Dr. H. D. House.

Aug. 2. "Floral and Scenic Features of the Island of Jamaica," by Dr. Marshall A. Howe.

Aug. 9. "Through the Central Andes of Colombia," by Dr. Francis W. Pennell.

Aug. 16. "Botanical Features of Ceylon," by Dr. H. A. Gleason.

Aug. 23. "Flowering Shrubs," by Mr. Arthur Herrington.
(Exhibition of Gladioli, August 23 and 24.)

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Acanthopanax senticosum. MANCHURIAN ACANTHOPANAX.

Location: Fruticetum.

Natural distribution: Manchuria.

Acanthopanax sessiliflorum. SESSILE-FLOWERED ACANTHOPANAX.

Location: Fruticetum.

Natural distribution: Manchuria and northern China.

Aralia. ARALIA

Aralia chinensis. CHINESE ANGELICA-TREE.

Location: Fruticetum. Arboretum.

Natural distribution: China and Japan.

Aralia chinensis var. **glabrescens.** SMOOTH CHINESE ANGELICA-TREE.

Location: Fruticetum. Arboretum.

Aralia chinensis var. **mandshurica.** MANCHURIAN ANGELICA-TREE.

Location: Fruticetum.

Aralia chinensis var. **variegata.** VARIEGATED CHINESE ANGELICA-TREE.

Location: Fruticetum.

Aralia spinosa. HERCULES' CLUB.

Location: Fruticetum.

Natural distribution: Southeastern United States.

CORNACEAE. Dogwood Family

Nyssa. SOUR GUM**Nyssa sylvatica.** SOUR GUM.

Location: Wild, common.

Natural distribution: Eastern North America.

Cornus. DOGWOOD**Cornus alternifolia.** ALTERNATE-LEAVED DOGWOOD.

Location: Fruticetum. Wild.

Natural distribution: Eastern North America.

Cornus Amomum. KINNIKINNIK.

Location: Fruticetum. Wild, along streams and in wet places.

Natural distribution: Eastern North America.

Cornus australis. ORIENTAL DOGWOOD.

Location: Fruticetum.

Natural distribution: Asia Minor and Caucasus.

Cornus Baileyi. BAILEY'S DOGWOOD.

Location: Fruticetum.

Natural distribution: Northeastern United States.

Cornus brachypoda. SHORT-STALKED DOGWOOD.

Location: Fruticetum.

Natural distribution: Japan and central China.

Cornus controversa. JAPANESE ALTERNATE-LEAVED DOGWOOD.

Location: Fruticetum.

Natural distribution: Himalayan region to Japan.

Cornus femina. PANICLED DOGWOOD.

Location: Fruticetum.

Natural distribution: Northeastern United States.

Cornus glabrata. CALIFORNIAN DOGWOOD.

Location: Fruticetum.

Natural distribution: Oregon to California.

Cornus Mas. CORNELIAN CHERRY.

Location: Fruticetum.

Natural distribution: Southern Europe and Asia Minor.

Cornus officinalis. SANDZAKI.

Location: Fruticetum.

Natural distribution: Japan and China.

Cornus paucinervis. FEW-NERVED DOGWOOD.

Location: Fruticetum.

Natural distribution: Central China.

Cornus rugosa. ROUND-LEAVED DOGWOOD.

Location: Fruticetum.

Natural distribution: Northeastern North America.

Cornus sanguinea. DOGBERRY.

Location: Fruticetum.

Natural distribution: Europe and the Orient.

Cornus stolonifera. RED-OSIER DOGWOOD.

Location: Fruticetum.

Natural distribution: Northern North America.

Cornus stolonifera var. **flaviramea.** YELLOW-BARKED DOGWOOD.

Location: Fruticetum. West end of west lake.

Cornus stricta. STIFF DOGWOOD.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Cynoxylon. FLOWERING DOGWOOD**Cynoxylon floridum.** FLOWERING DOGWOOD.

Location: Arboretum. Wild, common.

Natural distribution: Eastern United States.

Cynoxylon floridum var. **rubrum.** RED FLOWERING DOGWOOD.

Location: Arboretum.

Benthamia. JAPANESE FLOWERING DOGWOOD**Benthamia japonica.** JAPANESE FLOWERING DOGWOOD.

Location: Fruticetum.

Natural distribution: China and Japan.

Chamaepericlymenum. DWARF DOGWOOD**Chamaepericlymenum canadense.** DWARF DOGWOOD.

Location: American Wood Garden.

Natural distribution: Northern North America.

CLETHRACEAE. White-alder Family**Clethra.** SWEET PEPPER-BUSH**Clethra acuminata.** MOUNTAIN SWEET PEPPER-BUSH.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Clethra alnifolia. SWEET PEPPER-BUSH.

Location: Fruticetum. Wild.

Natural distribution: Eastern United States.

Clethra barbinervis. ASIATIC SWEET PEPPER-BUSH.

Location: Fruticetum.

Natural distribution: Eastern Asia.

ERICACEAE. Heath Family

Rhododendron. RHODODENDRON**Rhododendron album** var. **elegans.** WHITE SHOWY RHODODENDRON.

Location: North side of Conservatory Range 1.

Horticultural origin.

Rhododendron album var. **grandiflorum.** LARGE WHITE RHODODENDRON.

Location: Bank south of West Lake.

Horticultural origin.

Rhododendron arbutifolium. ARBUTUS-LEAVED RHODODENDRON.

Location: Fruticetum.

Hybrid.

Rhododendron atrosanguineum. DEEP RED RHODODENDRON.

Location: Bank south of West Lake.

Horticultural origin.

Rhododendron azaleoides. FRAGRANT RHODODENDRON.

Location: Fruticetum.

Hybrid.

Rhododendron carolinianum. CAROLINA RHODODENDRON.

Location: Bank, south side of west lake.

Natural distribution: Eastern Tennessee and western North and South Carolina.

Rhododendron catawbiense. MOUNTAIN ROSE BAY.

Location: Fruticetum. East bank of west lake.

Natural distribution: Southeastern United States.

Rhododendron catawbiense var. **album.** WHITE MOUNTAIN ROSE BAY.

Location: North side Conservatory Range 1.

Rhododendron catawbiense var. **grandiflorum**. LARGE-FLOW-
ERED MOUNTAIN ROSE BAY.

Location: North side of Conservatory Range 1.

Rhododendron delicatissimum. PALE PINK RHODODENDRON.

Location: North side of Conservatory Range 1.

Horticultural origin.

Rhododendron Everestianum. EVEREST'S RHODODENDRON.

Location: Museum fountain. North side of Conservatory
Range 1.

Horticultural origin. _____

NOTES, NEWS AND COMMENT

Dr. and Mrs. N. L. Britton spent a few days in June at Lake Mohonk, N. Y. and Dr. Britton addressed the guests of the Mountain House June 16 on "The Summer Wild Flowers of Mohonk."

Mrs. Flora W. Patterson, mycologist in the United States Department of Agriculture at Washington, was a recent visitor at the Garden. Mrs. Patterson is looked to for work on the Exoascales for North American Flora.

The Garden has recently received from Mr. A. S. Kalenborn an interesting collection of alpine plants from Peru, representing 128 species. They were obtained near Oroya, Peru, at altitudes ranging from 10,000 to 17,000 feet above sea level.

A set of herbarium specimens representing the species of *Ochroma* recently collected in Central America by Professor W. W. Rowlee has been added to the herbarium. The wood of *Ochroma*, known as balsawood, has recently attracted public attention because of its extreme lightness, adapting it to use in aeroplane construction.

Meteorology for May. The total precipitation for the month was 4.05 inches. The maximum temperatures recorded at the

New York Botanical Garden for each week were as follows: 92° on the 5th, 81° on the 14th, 76° on the 25th, and 94° on the 29th. The minimum temperatures were 41° on the 10th and 16th, 46° on the 21st, and 54° on the 28th.

The collection of dahlias, which attracted so much favorable comment last year, has again been planted near the New York Central station, and includes 379 named varieties. Near them 1,200 plants of hardy chrysanthemums have been set out, and in the Horticultural Grounds 20,000 corms of gladiolus have been planted, illustrating about 250 named varieties.

The Rose Garden reached its period of maximum spring flowering in the middle of June, when a great majority of the 450 kinds represented were in bloom at once. Some of the varieties suffered a little from the effects of unseasonably cold weather late in April, but the total amount of bloom was nevertheless fully as great as in 1918, although the flowering period was about a week later.

Professor Louis Blaringhem, distinguished botanist and geneticist of the University of Paris, spent a few days at the Garden recently. During the half-year just closed, Professor Blaringhem has been exchange professor from the Sorbonne to Harvard University, where he has delivered lectures on agriculture and heredity. While at the Garden Professor Blaringhem made a special study of herbarium material and living plants of the American oaks.

The display of Iris was at its height about Decoration Day, although some species had at that time already ceased to bloom and other late varieties had not yet begun. Of the latter, one of the most interesting is the red-brown flag, *Iris fulva*, whose deeply colored flowers were at their prime about June 15. This species is a native of the southern United States, extending as far north as southern Illinois; it is perfectly hardy in New York and is well worth a place in any Iris garden.

Dr. P.:A. Rydberg recently spent a few days at the National Herbarium, Washington, D. C., studying the collections of the family Ambrosiaceae. The manuscript for a revision of this family has been almost ready for several years, waiting an opportunity for publication in the North American Flora. It will now soon appear in print as the first part of volume 33, together with Dr. H. A. Gleason's monograph of the tribe Vernonieae of the family Carduaceae.

An interesting species of arum from India, *Amorphophallus bulbifer*, flowered in Conservatory Range 1, House 11, on June 20. The flower of this species is extremely malodorous, the pollen evidently being distributed in the native habitat of the plant by means of flies. About a month after the appearance of the flower, a large compound leaf appears which bears bulbs very much resembling the common hard-skinned puffball. A more extended description of this plant may be found in the JOURNAL for June, 1916.

At its annual commencement June 25, the University of Vermont conferred the honorary degree of Doctor of Science on Dr. Marshall A. Howe, curator of flowerless plants at the Garden, as a recognition of his important achievements in algology. Professor George P. Burns presented Dr. Howe for the degree in the following words: "Marshall Avery Howe, a native of Vermont, a graduate of the University in the class of 1890, a doctor of philosophy from Columbia University in 1898, botanist, teacher, author, explorer, and research worker, who has won a prominent place in all these fields of botanical science."

Dr. John K. Small returned from Florida in May, after a successful excursion devoted to the study and collection of cacti, especially those of the cereus group. From Miami as headquarters, two collecting trips were made across the peninsula, the one to the mouth of the Manatee River, the other to the mouth of the Caloosahatchee and to Marco in the northern part of the Ten Thousand Islands. The Florida reef was visited at

points all the way from Key West to Miami. Heretofore unobserved centers of cactus growth were discovered where several kinds of night-blooming cereus and prickly pears were found.

M. Lucien Morellet, of Paris, vice-president of the Geological Society of France, has recently sent to the Garden, by way of exchange, twelve beautifully preserved specimens, representing as many species, of fossil algae of the family Dasycladaceae, all from the Parisian Eocene. The fossil algae in the Garden collections had hitherto consisted chiefly of Lithothamnieae, a group of calcified red algae, and this contribution of material representing a family of calcified green algae constitutes a noteworthy addition to the collection of algae and of fossil plants. Discovery of related fossils in American strata is to be expected.

On June 17, over 300 biology pupils from the Morris High School, with Dr. Peabody and eight teachers, spent the forenoon at the Garden observing and making notes on tropical plants, trees, economic plants, and plant products, under the guidance and instruction of their own teachers and most of the Garden staff. Mr. C. G. Abbott, of the State Conservation Commission at Albany, gave an account of the various measures being taken by the Commission to preserve the wild life and other natural resources of the state. His lecture was illustrated with handsome colored lantern slides and was listened to with deep interest.

Professor H. H. Whetzel, of Cornell University, accompanied by his assistant, Mr. E. F. Hopkins, recently spent several days at the Garden in connection with his work on parasitic fungi. The special object of the trip was to make a life-history study of *Sclerotinia Geranii*, recently described by Dr. F. J. Seaver on the rootstocks of the wild geranium and not known to occur in any other region than the type locality. A survey of the grounds of the Garden was made and some interesting data collected relative to fungi parasitic on cultivated flowering plants. Professor Whetzel is expecting to monograph the genus *Sclerotinia* for North American Flora.

Volume 1 of "The Cactaceae, Descriptions and Illustrations of Plants of the Cactus Family," by N. L. Britton and J. N. Rose, was published June 21, 1919, and will be followed by three additional volumes before the monograph is completed. The book is a quarto, printed in the usual style of the publications from the Carnegie Institution of Washington, of which this is number 248. It is illustrated by 5 plates in photogravure, 3 in half-tone, and 28 in color, and by 302 text figures in half-tone or zinc. The first two of the tribes of Cactaceae are included: Pereskiaeae, with a single genus and 19 species, and Opuntieae, with 7 genera and 283 species, of which 254 are comprised within the genus *Opuntia*.

Mr. Henry John Elwes, F.R.S., of Colesborne Park, near Cheltenham, Gloucestershire, spent portions of several days at the Garden about the middle of June, sailing for England on June 16. Mr. Elwes has been interested in botany for many years, and is well known to the scientific world not only by his numerous papers scattered in the proceedings of learned societies, but by his magnificent monograph of the genus *Lilium* (1877-1880), and the great work on the trees of Great Britain and Ireland (seven volumes, 1906-1915) prepared by him in collaboration with Dr. Augustine Henry. The monograph of *Lilium* is now about forty years old, and Mr. Elwes is at work upon a supplement to it.

The June Biological Trip of the Evander Childs High School to the New York Botanical Garden took place on Thursday, June 19, under the leadership of Mr. Paul B. Mann and three of his teachers, assisted by eight members of the Garden staff. The pupils, 300 in number, assembled at the entrance to Conservatory Range 1 and were guided through the fifteen houses of this range in groups of 30. Trees and various kinds of herbaceous plants were then studied in the valley east of the Conservatories, and plant products on the main floor of the Museum Building. Mr. George E. Hewitt gave an illustrated lecture on the subject of forestry, which was a fitting climax to a very successful and enjoyable occasion.

Through exchange with the American Museum of Natural History, the Garden has recently acquired twenty-eight specimens of matrix containing some twenty species of fossil plants, representing a part of the collection made in 1891 and 1892 on the south shore of Nugsuak peninsula, Greenland, by the Arctic Expedition of the Philadelphia Academy of Sciences, under command of Robert E. Peary, C.E. (now Rear Admiral), U.S.N. These are the only fossil plants from Greenland in the Garden collections and they constitute a very valuable and interesting addition to the Cretaceous and Tertiary floras. They apparently belong to the Upper Cretaceous (Patoot) and Eocene-Tertiary (Upper Atané) beds, described by Oswald Heer in his "Flora Fossilis Arctica," volumes 1, 2, 3, 6, and 7.

The following botanists have recently registered in the library: Professor L. R. Abrams, Stanford University, Cal.; Professor H. H. Whetzel, E. F. Hopkins and Professor H. M. Fitzpatrick, Ithaca, N. Y.; Dr. Camillo Schneider, Jamaica Plain, Mass.; Professor Alexander W. Evans and Professor James W. Toumey, New Haven, Conn.; Tetsu Sakamura, Sapporo, Japan; Masayasu Kanda, Hiroshima, Japan; Huron H. Smith, Milwaukee, Wis.; Professor D. S. Johnson, Baltimore, Md.; Professor L. Blaringhem, Université de Paris; Grace J. Livingston and Wm. T. Davis, New York; H. J. Elwes, Cheltenham, Eng.; Mr. and Mrs. W. W. Eggleston, Washington, D. C.; Professor Charles S. Boyer, Philadelphia, Pa.; and Prof. H. M. Quanjér, Wageningen, Holland.

The oldest Japanese chestnut tree on the grounds, one that has survived since the early days of the Garden, persisting through the terrible epidemic of canker which killed off all the other chestnuts, failed to put forth its leaves this spring. It is dead—killed by an attack of the canker that was almost imperceptible at first, but finally proved too strong for it. This tree has been carefully observed for fourteen years, or since the canker was discovered in this vicinity. The disease gained entrance several years ago through a small branch three feet above the ground

and worked away at the base of the trunk until it was completely girdled. Only one small canker was found in the top of the tree, which had a spread of twenty feet or more and remained green through the season of 1918.

Leaf-blight of the plane-tree and white oak has been unusually prevalent this season, owing to the wet weather in May. This disease, which renders the trees so unsightly, may be controlled by sanitation, pruning, and spraying, but the process is expensive and exacting. Spraying alone will be of value if done at the proper time. Use the strongest Bordeaux mixture (5-5-50), applying it thoroughly with a power sprayer before the leaves are half grown, and repeat two or three times at intervals of a week or ten days according to the weather. This solution kills the summer spores and prevents infection of the new leaves. If the dead twigs and leaves, both on the trees and on the ground, are collected and burned, the winter spores will be killed and the disease will not appear with the opening of the buds. All the trees in a given locality should be treated at once.

Dr. Fred J. Seaver spent the first week of June at Ithaca, New York, collecting fungi in collaboration with Cornell University, the Brooklyn Botanic Garden, and Syracuse University. Three main trips were made, one to Enfield's Gorge, one to Labrador Lake about forty miles from Ithaca, and one to the bogs of Mud Pond Basin near McLean. Other local trips were made in the gorges immediately adjacent to the college campus. When necessary, transportation facilities were provided by the extension cars of the Agricultural College and the various trips were attended by a number of the graduate students and staff of the department of plant pathology under the direction of Professor H. H. Whetzel. While an exact count has not yet been made, the trip will probably add more than two hundred specimens of ascomycetes and parasitic fungi to the Garden collections. No especial attention was given to the higher fungi since none of the party was particularly interested in those forms.

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OF
The New York Botanical Garden

EDITOR

H. A. GLEASON

First Assistant

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Figure 1. Bleaching the leaves of *Carloduvica palmata*.



Figure 2. Hybrid walnut tree.

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BOTANICAL EXPLORATIONS IN ECUADOR IN 1918*

(WITH PLATES 234 AND 235)

Soon after the coöperative plan for botanical explorations in South America was organized by the New York Botanical Garden, the Gray Herbarium of Harvard University, and the United States National Museum, I was authorized to inaugurate this work in Ecuador.† I was accompanied by my son George who acted as photographer and general assistant. We left Washington July 22, 1918, going by way of Key West, Havana, and Panama to Guayaquil, Ecuador. At each of these places while waiting for steamers small collections were made.

We arrived in Guayaquil August 9, at a time when yellow fever was especially prevalent and very malignant, and we hoped to proceed immediately to the interior but were obliged to remain in Guayaquil from Friday until Monday. During this time we visited the neighboring hills about the city, which were then most luxuriantly clothed with flowering vines and shrubs. Guayaquil has long been a very interesting botanical locality, for here it was that Humboldt and Bonpland collected a number of their types and various exploring expeditions, such as the ones connected with the "Sulphur" and the "Herald," have made collections. The flora here is extremely interesting and varied,

* Printed with permission of the Secretary of the Smithsonian Institution.

† Upon the recommendation of Mr. F. V. Coville and Mr. David Fairchild, the United States Department of Agriculture gave financial assistance towards this investigation.

due to diversity of habitat, for on one side of the city runs the Guayas, a magnificent river which drains the western ranges of the Andes of Ecuador, while on the other side a great salt lagoon, bordered with all kinds of saline vegetation, pushes up from the ocean. Strange to say, through the bushes of these salt marshes clammers a very remarkable cactus belonging to the genus *Hylocereus*. Then too, a little farther away from the city is an arid belt, where grow thorn-bushes and cacti, and here we discovered one or more arborescent cacti.

From Guayaquil we went by train to the little town of Huigra, located about 70 miles from the coast at an elevation of 4,000 feet above the sea. The town is built on the banks of the Chanchan River and nestles in the narrow valley with high mountains reaching up on each side of it. Huigra, being the headquarters of the Guayaquil and Quito Railway Company, forms a most suitable base from which to carry on botanical explorations. It has a small comfortable hotel which can be used for headquarters and from which excursions can be made by foot or by train up and down the railroad or by horseback into the high mountains either to the north or south. In a few hours one can pass from the semiarid valley about Huigra into the fog-covered forests where the trees are festooned with long masses of delicate mosses and liverworts, with epiphytic ericaceous plants and with climbing species of *Oxalis*, *Viola* and *Solanum*. Or one can drop down the Chanchan Valley by gravity on a hand-car and, in a few hours, be in the midst of a luxuriant tropical vegetation, surrounded by tall graceful palms and bamboos where the moist banks are covered with delicate ferns and beautiful purple-flowered orchids (*Bletia* sp.). In this wet forest is found the red-bark or cinchona tree which is one of the sources of quinine (Fig. 1, plate 235). In this same region, too, were found a little-known *Zamia* (*Z. Lindenii*), an arborescent ivory-palm, and a *Marcgravia* with curious bottle-shaped bracts on the flower stalks, each used as a home by a mountain bee.

We used Huigra for our base for the entire season, making side trips from time to time, once going to Ambato, which is located between the two high ranges of the Andes. This is

the city in which Richard Spruce spent so much time when in Ecuador and from which he wrote many of his fascinating letters. It is in a treeless region, thickly populated, with the land under a high state of cultivation. It is the chief fruit-growing region of Ecuador and nearly all kinds of temperate and tropical fruits are sold. Here we were the guests of Professor Abelardo Pachano, of the Quinta Normal, and here we also met the Martinez brothers, men of science and influence in Ecuador.

At another time we went from Huigra to Quito, from which we made side trips, going once as far north as San Antonio in quest of a new *Opuntia* which had been reported by the veteran naturalist, Ludovic Soederstrom. A species of *Gunnera*, near *G. scabra*, which was in cultivation at the American Legation at Quito, is shown in Figure 2, Plate 235. The gunneras of Ecuador are very ornamental and interesting, but are little understood and deserve careful study.

Our most extended trip was into southern Ecuador, on which occasion we were accompanied by Professor Pachano. Here we traversed Humboldt and Bonpland's route along the interandean valley. The road, which is only a trail, is almost impassable a great part of the year and we found it extremely bad even at the end of the dry season.

We went from Huigra via Cañar and Azogues to Cuenca, where we spent nearly a week. During that time we visited Baños, another of Humboldt's localities, where there are hot springs and a remarkable outcrop of marble. From Cuenca we went via Cumbe, Nabon, and Oña to Loja, all localities mentioned by Humboldt. At Loja we spent four days and then went down to Portovelo across a very remarkable semiarid valley, the Cata-mayo, where we found a number of strange cacti, including *Cactus lanatus* and *Cactus laetus** of Humboldt. At Portovelo are located the mines of the South American Development Company. It is a very beautiful little town with modern improvements and an up-to-date American hospital with an American doctor and nurse. Here we were the guests of the general manager and his wife, Mr. and Mrs. Andrew Mellick Tweedy. This is

* *Lemaireocereus laetus* (H.B.K.) Britton and Rose.
Cactus laetus H.B.K., Nov. Gen. et Sp. 6: 68. 1823.

a most interesting orchid region and we made two excursions into the neighboring mountains with Dr. and Mrs. Greenwood in search of rare species with whose haunts they are very familiar. The most conspicuous one was a species of *Cattleya*, which grew in great purple clusters in tall trees, usually in inaccessible places.

From Portovelo we went west across the western Andes to Santa Rosa near the coast where we took a little steamer up to Guayaquil and then went back by rail to our base at Huigra. We remained about two weeks longer in Huigra and its vicinity, then packed our collections and outfit into twenty-eight boxes, trunks, and packages and bade farewell to Ecuador.

We left Guayaquil on November 8, spent one day at anchor off Manta, Ecuador, and, going by way of Panama, Haiti, and New York arrived in Washington December 4, having been away nearly five months.

It is impossible to give in a few lines a very clear idea of the varied flora of Ecuador, extending as it does from the tropical coast of the Pacific Ocean to the everlasting snows of Chimborazo. My collection of some two thousand numbers represents only a small part of this large and varied flora. Perhaps a brief account of some of the families and most striking genera would be of interest and value.

The Cactaceae of Ecuador have heretofore been little known, only some ten or twelve species having been reported. I collected forty-four numbers representing some thirty species, ten of which, at least, are new to science. It is rather remarkable to find so many large and even arborescent species undescribed.

The grasses are very many and extremely diverse, for in the high Andes are found the delicate little species of *Poa* and in the valleys of the foothills are found giant bamboos, nearly a foot in diameter. These giant bamboos form a very important article of commerce and are used everywhere on the coast and in the foothills in the construction of the native houses and even the churches and better type of residences. In the mountains there are two bamboos with solid stems which are used in building fences and in forming the framework of mud houses. I have been unable to identify either of these.



Figure 1. Cinchona tree with bark removed.



Figure 2. Gunnera cultivated at the American Legation at Quito.

The ferns are very abundant and of many types. In the fog-covered forests are delicate filmy ferns while in the deep valleys of the lower mountains are giant tree ferns whose trunks are used in the construction of houses and for fence posts. In southern Ecuador I collected a species of *Polypodium*, probably new, with large fleshy tubers like those of *Polypodium bifrons*.

I was very much surprised to find in the mountains of Ecuador one or more species of *Juglans* similar to our own black walnut and also a hybrid of the native and English walnut (Fig. 2, plate 234).

Several species of *Berberis*, some of ornamental value, were seen in the Andes and several species of *Tropaeolum* are common and interesting. The genus *Eupatorium* occurs in many forms in the mountains. Fifty species have been reported from Ecuador. I collected thirty-four species during my trip. In the wooded mountains and on the high paramos there are many species of the heath Family, represented by large shrubs or by low creeping plants, while in the wet forests they occur as epiphytes.

The bleaching of the leaves of *Carludovica palmata* is illustrated in Fig. 1, plate 234. These leaves are used in the region of Azogues for making Panama hats.

We received many courtesies, only a few of which we can mention here. Through the kindness of the Central and South American Cable Company we were able to keep our home people in touch with us all through the trying days at the close of the war when steamer and postal connections were so disarranged. We were under special obligations to Mr. George Powell, long the general manager of the company in Ecuador and to Mr. F. Woodcock, in charge at Colon. Our genial and efficient consul-general at Guayaquil, Dr. Francis W. Goding, was also most helpful. It was only through courtesies extended by him that we were able to ship our living collections home successfully. Mr. Alfred Cartwright, long connected with the British Consular Service at Guayaquil, gave us much valuable information regarding the plants of Ecuador.

While in Ecuador we were the guests of the Guayaquil and

Quito Railway Company and were under many obligations to Mr. John Dobbie, general manager of the road, and to the conductors and railway men generally for courtesies extended. Our genial host, Mr. Edward Morley, of Huigra, not only cared for our bodily wants but sometimes acted as guide and companion on perilous trips into the high mountains.

J. N. ROSE.

A LARGE TULIP TREE STRUCK BY LIGHTNING

During the violent thunder-storm on the afternoon of Friday, June 20, when it became so dark that reading was impossible without artificial light, one of the tallest tulip trees in the Garden reservation was struck by a powerful electric discharge and scarred from top to the base, its bark and outer wood layers being thrown off along a slightly winding strip on the north side some five inches wide; a small hemlock-spruce alongside was also affected and the ground beneath the tree was much disturbed. The tree stands near the north end of the hemlock grove, quite in the woods, a few steps east of the path leading from the water-garden to the economic garden, and from this path the effects of the lightning stroke may be observed; it is a hundred feet or more in height, with a circumference of ten feet; its top projects above the surrounding forest.

Lightning has struck a number of trees in the Garden, both isolated and in the woods, from time to time, and whenever a severe thunder-storm comes across the reservation such strokes have come to be expected. Some records of these were made by Dr. MacDougal and discussed by him in *Journal* 3: 131-135. 1902. Record of the loss of the largest pin-oak may be found in *Journal* 7: 154-156. 1906. Many which have been struck have not been recorded. None have survived the injuries received, either dying after a time or becoming so decrepit as to require their removal.

The case here described will be interesting to follow; it is expected that the stricken *Liriodendron* will show signs of its injury within a short time.

N. L. BRITTON.

BIRDS OF THE BOTANICAL GARDEN

IV. NESTING—1919

The nesting season for most birds has been dry this year, with only one or two violent storms, and the feathered creatures have correspondingly prospered. It is no uncommon sight to see several pairs of thrashers and grosbeaks feeding their young in the Garden. Near the rubblestone bridge there were nests of redstart, Maryland yellow-throat, yellow warbler, red-eyed vireo, song sparrow, phoebe, robin, catbird, red-winged blackbird, flicker, and the usually more retiring nuthatch. The nest of the last was deep in a natural pocket of the smaller tulip-tree that stands next the twin tulips which sentinel the walk to the east and are background for many photographs.

In this vicinity also was the chosen home of the wood ducks and black duck, and they as well fared better than usual, one rearing eleven young, a second eight, and another two. While these families were showing off in the lily pool, a white-fronted goose from the Zoölogical Park came up the river for company. Farther north on the river-walk a ruby-throated hummingbird hung her cradle and sang her lullabies as the shifting winds swung the slender branch that near its very tip bore this precious beauty and her little ones. This nest looks like a knot in shape, but it is not the color of one, nor is it always covered with lichens. Its diminutive size would alone make it inconspicuous, but, once directed, the eye has no trouble in finding it. When the mother bird returned to the nest she would, if she discovered observers, hover repeatedly about a leaf as if to distract attention, and then dive suddenly into the nest. A woodpecker's hole served to shelter a screech owl. It was well to the top of the largest sycamore tree, just above the bridge at the north end of the Garden. Oriole, veery, and wood thrush nests were plentiful, and scarlet tanager and meadowlark remained through the nesting season.

After a winter that gave it Acadian owl, hermit thrush, brown thrasher, sapsucker, grackle, and half a dozen fox sparrows (a one-legged bird among them) as "permanent residents," the Botanical Garden may well be proud of its showing.

FRED F. HOUGHTON.

MEETING OF POTATO PATHOLOGISTS

On June 24-26, Dr. Seaver represented the Garden at the meeting of potato pathologists held on Long Island for the purpose of studying the various experiments conducted there by the state and by the United States Department of Agriculture. The meeting was one of the most important of its kind ever held, since it was attended not only by representatives from many of our own states but also from England, Ireland, Holland, Bermuda and Canada, about ninety in all being in attendance.

The headquarters for the meeting during the first three days was at Riverhead, Long Island. The first meeting was held in the court-house at Riverhead on Tuesday evening, June 24. The address of welcome was given by Mr. Talmage, one of the large potato growers of the Island. Mr. Talmage referred to the fact that plant pathologists are inclined to criticize the farmer for not taking advice more readily. He explained that the reason for this was the fact that many of the farmers felt that the advice was given by a set of men who would starve to death if they had to make a living on the farm, hence their slowness to take up with new suggestions. After introductory remarks by a number of the members, the work for the following day was outlined in detail, which was to consist of an examination of the various experiments being conducted. The transportation facilities, which consisted of about twenty-five autos, were provided on Wednesday by the North side farmers and on Thursday by those of the South side.

On Thursday trips were made as far as Orient on the extreme eastern end of the island, stops being made at intervals for the study of fertilizer tests, immature seed tests, and for the study of the so-called degeneration diseases "mosaic" and "leaf roll." Special interest was shown in the latter, the stock for which was supplied by Mr. P. A. Murphy, of Canada, Mr. E. J. Wortley, of Bermuda, and Dr. H. A. Edson, of the United States Department of Agriculture. An attempt was made to show to what extent the diseases are contagious and the effect of climate as a prerequisite for the diseases. On Wednesday evening a

second meeting was held at the court-house at Riverhead for a discussion of the experiments examined during the day and to outline the work for the next day. A great deal of interest was shown and the meeting continued to a late hour.

On Thursday a trip was made from Riverhead to Bridgehampton, with a number of stops en route, for the inspection of various potato plantations. In the afternoon an outdoor meeting was held at Watermill. At this meeting papers were presented by Dr. Cotton, of England, on plant pathology in England, by Dr. Pethybridge, of Ireland, on conditions in that country with special reference to the "wart disease," by Dr. Quanjier, of Holland, and by Dr. Edson, of Washington. The last two speakers dealt largely with the degeneration diseases, "mosaic" and "leaf roll." The latest work and theories regarding the causes and method of dissemination of these diseases were considered. After discussions of the various papers the party left for New York where the work was continued.

On Friday, Dr. A. B. Stout, of the Garden staff, joined the party for the inspection trip in Nassau County. The party proceeded by railroad from New York City to Mineola, from which transportation by motor cars was provided by Nassau County farmers. The day's itinerary included a visit to Hicks' nurseries at Westbury; an inspection of the truck farm of Mr. S. G. Burke south of Hicksville; a stop of some time at the field laboratory at Greenlawn in charge of Mr. I. H. Vogel, who discussed the work in progress at this field station; lunch at Centreport, with short talks by all the visitors from foreign countries; and then back to railroad stations by way of Cold Spring Harbor and Oyster Bay, with a stop on the estate of Hon. Geo. D. Pratt at Glen Cove. Rain during the afternoon made it necessary to omit the inspection of the potato-mosaic test at Glen Head.

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Rhododendron giganteum. TALL RHODODENDRON.

Location: North side of Conservatory Range 1.

Horticultural origin.

Rhododendron maximum. GREAT LAUREL.

Location: East bank of west lake. West end of Stone Bridge.

Natural distribution: Eastern North America.

Rhododendron praecox. EARLY RHODODENDRON.

Location: Fruticetum.

Hybrid.

Rhododendron purpureum var. **elegans.** SHOWY PURPLE RHODODENDRON.

Location: North side of Conservatory Range 1.

Horticultural origin.

Rhododendron roseum var. **elegans.** SHOWY ROSE RHODODENDRON

Location: North side of Conservatory Range 1.

Horticultural origin.

In addition to the above the following, of horticultural origin, are in the collections: Abraham Lincoln, Boule de Neige, Caractacus, Charles Bagley, Charles Dickens, Edward S. Rand, Gen. Grant, H. H. Hunnewell, H. W. Sargent, James Bateman, Kettledrum, Lady Armstrong, Milton, Mrs. C. H. Sargent, Mrs. H. Ingersoll, Mrs. Milner, Parson's gloriosa, Parson's grandiflora, R. S. Field, Sefton.

Biltia. BILTIA

Biltia Vaseyi. VASEY'S AZALEA.

Location: Fruticetum.

Natural distribution: North Carolina.

Azalea. AZALEA

Azalea amoena. PLEASING AZALEA.

Location: Fruticetum. Flower beds north of Conservatory Range 1.

Horticultural origin.

- Azalea amoena** var. **Dainzo**. DAINZO AZALEA.
 Location: Fruticetum.
- Azalea amoena** var. **Hinodegiri**. FIREFLY AZALEA.
 Location: Fountain in front of Museum. Fruticetum.
- Azalea amoena** var. **Mikado**. MIKADO AZALEA.
 Location: Fruticetum.
- Azalea amoena** var. **splendens**. SHOWY AZALEA.
 Location: Fruticetum.
- Azalea arborescens**. SMOOTH AZALEA.
 Location: Fruticetum.
 Natural distribution: Eastern United States.
- Azalea canescens**. MOUNTAIN AZALEA.
 Location: Fruticetum.
 Natural distribution: Eastern United States.
- Azalea coccinea** var. **speciosa**. SHOWY ORANGE AZALEA.
 Location: Conservatory bed no. 9.
 Horticultural origin.
- Azalea Daviesii**. DAVIES' AZALEA.
 Location: Conservatory bed no. 10.
 Horticultural origin.
- Azalea Kaempferi**. KAEMPFER'S AZALEA.
 Location: Fruticetum.
 Natural distribution: Japan.
- Azalea ledifolia** var. **alba**. WHITE CHINESE AZALEA.
 Location: Fruticetum.
 Natural distribution: China.
- Azalea ledifolia** var. **Fuji Manyo**. FUJI MANYO AZALEA.
 Location: Fruticetum.
- Azalea ledifolia** var. **narcissiflora**. YODOGAWA AZALEA.
 Location: Fruticetum.
- Azalea linearifolia**. LINEAR-LEAVED AZALEA.
 Location: Fruticetum.
 Natural distribution: Japan.
- Azalea lutea**. FLAME AZALEA.
 Location: Fruticetum.
 Natural distribution: Eastern United States.

Azalea nudiflora. WILD HONEYSUCKLE.

Location: Fruticetum. Triangle near west end of West Lake.

Natural distribution: Eastern United States.

Azalea nudiflora var. **alba.** WHITE WILD HONEYSUCKLE.

Location: Fruticetum.

Azalea occidentalis. WESTERN AZALEA.

Location: Fruticetum.

Natural distribution: Western North America.

Azalea sinensis. WOOLLY AZALEA.

Location: Fruticetum.

Natural distribution: China and Japan.

Azalea viscosa. SWAMP HONEYSUCKLE.

Location: Near Boulder Bridge.

Natural distribution: Eastern United States.

The following azaleas, of horticultural origin, are also in the collections: alta Clarence, Beaute coeleste, Bouquet Flore, Dominica Scassi, Hollandia, J. C. Van Tol, Nancy Waterer, Pallas, Raphael de Smet.

Menziesia. MENZIESIA**Menziesia pilosa.** MINNIE-BUSH.

Location: American Wood Garden.

Natural distribution: Pennsylvania to Georgia.

Dendrium. SAND MYRTLE**Dendrium buxifolium.** SAND MYRTLE.

Location: Fruticetum.

Natural distribution: New Jersey to Florida.

Kalmia. LAUREL**Kalmia angustifolia.** SHEEP LAUREL.

Location: Fruticetum.

Natural distribution: Northeastern North America.

Kalmia latifolia. MOUNTAIN LAUREL.

Location: Fruticetum. East bank of West Lake south of the bridge. West end of Boulder Bridge.

Natural distribution: Eastern North America.

Enkianthus. ENKIANTHUS**Enkianthus campanulatus.** BELL-FLOWERED ENKIANTHUS.

Location: Fruticetum.

Natural distribution: Japan.

Enkianthus perulatus. JAPANESE ENKIANTHUS.

Location: Fruticetum.

Natural distribution: Japan.

Chamaedaphne. LEATHER-LEAF**Chamaedaphne calyculata.** LEATHER-LEAF.

Location: Fruticetum. Bank at east end of West Lake, south of bridge.

Natural distribution: Northern North America.

Leucothoë. LEUCOTHOË**Leucothoë Catesbaei.** CATESBY'S LEUCOTHOË.

Location: Fruticetum. Fountain in front of Museum.

Natural distribution: Virginia to Tennessee and Georgia.

Eubotrys. EUBOTRYS**Eubotrys racemosa.** SWAMP LEUCOTHOË.

Location: Aquatic Garden.

Natural distribution: Southeastern United States.

Eubotrys recurva. MOUNTAIN LEUCOTHOË.

Location: Fruticetum.

Natural distribution: Virginia to Alabama.

Pieris. PIERIS**Pieris floribunda.** MOUNTAIN FETTER-BUSH.

Location: Fruticetum. Fountain in front of Museum.

Natural distribution: Virginia to Georgia.

Pieris japonica. JAPANESE PIERIS.

Location: Fruticetum. Fountain in front of Museum.

Natural distribution: Japan.

Neopieris. STAGGER-BUSH**Neopieris mariana.** STAGGER-BUSH.

Location: Fruticetum.

Natural distribution: Southeastern United States.

NOTES, NEWS AND COMMENT

Professor W. C. Coker, of the University of North Carolina, was at the Garden during a part of July consulting the library and mycological collections.

Dr. Charles E. Fairman, of Lyndonville, New York, spent the first part of July studying certain collections of fungi in the herbarium of the Garden. He is preparing manuscript for North American Flora.

Mrs. S. W. Wheeler, curator in the Department of Botany at the Agricultural College at Amherst, Massachusetts, recently called at the Garden to look over specimens of the powdery mildews in connection with her work on the species occurring in Massachusetts.

Seventy pupils and teachers from the Jewish School at 500 East 140th Street visited the Garden July 9, to study the economic collections in the museum building and living plants in certain parts of the grounds, under the guidance and instruction of four members of the Garden Staff.

Mr. Edgar L. Dickerson, of New Brunswick, New Jersey, visited the Garden on June 30 to study the blue willow beetle, which is attacking various species of willow and poplar on the grounds of the Garden. Mr. Dickerson and Mr. Weiss made a special study of this insect a few years ago, soon after its introduction into this country from Europe.

Meteorology for June.—The total precipitation for the month of June was 1.14 inches. The maximum temperatures recorded at the Garden for each week were 94° on the 2d, 87° on the 13th, 88° on the 22d, and 93° on the 24th. The minimum temperatures were 54° on the 9th, 52° on the 13th, 47° on the 23rd, and 48° on the 29th.

The rhododendron lace bug, so destructive to rhododendrons in this region, has appeared on mountain laurel planted near rhododendron. As the leaves are thinner, the effect is quickly noticed and the plants soon become brown and unsightly. Careful and repeated spraying with nicotine solution or kerosene emulsion is the only remedy. The bugs collect in large numbers on the under sides of the leaves. To the unaided eye they appear as animated fish scales, while under a hand lens their lace-like character becomes strikingly manifest.

Professor H. M. Fitzpatrick, of Cornell University, visited the Garden several times in July in connection with efforts that are being made by the U. S. Department of Agriculture to stamp out the potato wart disease. This is one of the most dangerous diseases of Irish potatoes known. Rough, spongy outgrowths of varying size are produced on the tubers, especially at the eyes. These warts are light-brown at first, but become black and decayed with age. Sometimes all the potatoes in affected hills are worthless. Fortunately the disease does not attack the vines above ground.

Professor Bernhard E. Fernow, formerly chief of the Division of Forestry of the United States Department of Agriculture and later director of the New York State College of Forestry at Cornell University, has retired from the position of dean of the Faculty of Forestry at the University of Toronto, held by him since 1907. Dr. Clifton D. Howe, a brother of Dr. Marshall A. Howe of the Garden, has been appointed acting dean. Dr. Howe was a member of the Garden's collecting expedition to Nova Scotia and Newfoundland in the summer of 1901.

The following botanists have recently registered in the library: Mr. Arthur D. Cotton, Kew, England; Mr. George H. Pethybridge, Dublin, Ireland; Professor C. R. Orton, State College, Pa.; Professor R. Kent Beattie, Washington, D. C.; Professors C. H. Myers, W. W. Rowlee, and F. P. Bussell, Ithaca, N. Y.; Professor

J. B. S. Norton, College Park, Md.; Professor Frederick H. Blodgett, Danbury, Conn.; Charles E. Fairman, M. D., Lyndonville, N. Y.; Frère G. Arsène, Philadelphia, Pa.; Mrs. S. W. Wheeler, Amherst, Mass.; Professor Alexander W. Evans, New Haven, Conn.; Dr. Ralph G. Mills, Peking, China; Professor Kingo Miyabe, Sapporo, Japan; Professor W. C. Coker, Chapel Hill, N. C.; Dr. Felipe García Cañizares, Havana, Cuba; Dr. Stephen C. Bruner, Santiago de las Vegas, Cuba; Dr. Hernfrid Witte, Svalöf, Sweden; Dr. Ivan Jörstad, Kristiania, Norway; and Miss Anna Whitman Clark, Binghamton, N. Y.

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EDITOR

H. A. GLEASON

First Assistant



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SOME FICTITIOUS BOTANISTS

It is difficult to believe that, in this day of enlightenment, standard works of reference should contain purely fictitious accounts of scientists who, if they ever existed, certainly never did nor wrote those deeds and writings with which they are credited. Yet it is true that when, about thirty years ago, "Appleton's Cyclopedia of American biography" was published, a considerable number of such spurious sketches crept into this work, otherwise so authentic. Whether these biographies were "original" contributions to the cyclopedia just mentioned, or were copied from some Spanish-American source, I do not know, but I have failed to trace them to any earlier printed accounts.

At first these products of the vivid imagination of some gifted writer—for they bear internal evidence of no small degree of ingenuity—were ignored, and did no particular harm. But during the last few years they have been making an impression upon the literature of scientific biography and bibliography, and it has become very necessary to expose their true character, which has been known to me for many years.

It is impossible for me to say how many of these fictitious biographical accounts are included in the cyclopedia, but I have selected fourteen of them which, by reason of the claim that their subjects were famous botanists, I am in a position to brand as false. The number of similar sketches of men who are erroneously said to have devoted attention to other branches of science is probably considerable, but I cannot make such definite assertions about them. And I have omitted several of the so-called

"botanists" that I believe to be in the same class, but about whom there might remain some room for doubt, such as Davila, Goicoechea, Pereira and Pierola.

Behold, then, the fairy-tales:

IGOLINO, Giuseppe (e-go-le'-no), Italian botanist, b. in Florence in 1759; d. there in 1833. He came to the United States in 1803 on a scientific mission, and remained till 1807 as Italian vice-consul in North Carolina. He sent to Europe several cases of seeds, and discovered some new gramineals, which he described afterward in his "*Agrostographia*" (Florence, 1824). He was relieved from his consular duties in 1807, but two years later was appointed consul at Buenos Ayres. During his stay in the United States his attention was called to the Mexican hieroglyphs, which had already occupied the attention of many distinguished men of science, and it is asserted that he found a key to them, but lost the manuscript among others when he was shipwrecked in the Straits of Bonifacio on his return to Genoa in 1808. He was the first European to study the anthropology of America, and thus led the way to the work of Darwin, Boyer, De Quatrefages, and Brasseur de Bourbourg. During his stay in South America in 1809-'19, Igolino formed a rich collection of plants and engravings of animals and insects peculiar to those latitudes, studying also the cryptogamic plants of Brazil. He published "*Plantae cryptogamae Brasiliae*" (Florence, 1829), and read several papers before the Academy of Florence on the "Effects of the Colored Upas," and on the several species of strychnia peculiar to South America. See "*Vita illustrissimi Giuseppe Igolino*" (Florence, 1841).

[The books credited to Igolino exist; they were by the well-known botanist Giuseppe Raddi (1770-1829), who was, like the fictitious Igolino, a Florentine. Raddi accompanied the Austrian expedition to Brazil in 1817, and returned to Europe in June of the following year; otherwise he was never in America.]

KEHR, Gustav Herman (kair), German botanist, b. in Freysingen in 1581; d. in Magdeburg in 1639. He was professor in the universities of Tübingen and Halle, and afterward librarian of the Prince of Lippe-Detmold, who sent him in 1621 to America to study the plants of that country. Kehr went first to New Spain, and after several years crossed the Isthmus of Panama, and, sailing for Patagonia, studied the plants of the country that is now the Argentine Republic from 1624 till 1629, visiting

afterward Chili, Brazil, and Peru. On his return he published, among other works, "*De Sexu plantarum*" (Magdeburg, 1631); "*Aphorismi botanicae*" (Tübingen, 1633); "*Historia generalis plantarum Americanarum*" (3 vols. Halle, 1635); "*Grundlehren der Anatomie und Physiologie der Pflanzen von Amerika*" (Magdeburg, 1636); "*Sertum Patagonicum et florula peruvien-sis*" (2 vols., Dresden, 1636); "*Criptogamae Brasilienses ab Gustavio Kehr collectae*" (Magdeburg, 1632); and "*Reisen in Amerika*" (2 vols., 1639).

[Wholly fictitious. The earliest work on sex in plants was the "*Epistola de sexu plantarum*" of R. J. Camerarius, published in 1694. The title "*Aphorismi botanici*" was probably first used in a small volume by C. A. Agardh, commenced in 1817. The word "*cryptogamia*" was first coined by Linnaeus, in 1737; "*cryptogamae*" is a much later form of the same word, perhaps first used after the year 1800. The earliest work on the flora of Peru dates from 1714. The title "*Grundlehren der Anatomie und Physiologie der Pflanzen*" (without the ridiculous "*von Amerika*") reappears under "*Nascher*" below, as does also the "*Criptogamae Brasilienses*" title. This account of Kehr and his books is the least plausible of all those here reprinted; the dates assigned are so much too early that they would deceive no one in the least familiar with the history of botany.]

KERCKHOVE, Lorenz Wenceslas (kair-ko'-veh), Dutch naturalist, b. in Bois le Duc in 1785; d. in Amsterdam in 1839. He studied in Rotterdam, and early showed a fondness for the natural sciences. At the age of sixteen he joined an uncle who was established in business in New York; but having made the acquaintance of Alexander von Humboldt during his sojourn in the United States in 1802, he gave up business and went to Central America. He had resolved to follow the steps of the German naturalist, and like him write an account of his travels, but after visiting the West Indies, Central America, Louisiana, Mexico, and Guiana, during 1804-'9, his health declined and he was compelled to return to his native land. For several years he was professor of natural history in the University of Leyden, but resigned in 1821 to devote himself exclusively to science, and settling in Amsterdam, published many works, including "*Reisen durch Cuba, Porto Rico, Louisiana, Nueva España und Guiana*"

(2 vols., Leyden, 1817); "Historia ecclesiastica et Universalis Guianae" (Amsterdam, 1825); "Die Kriege von 1814–1821 in Mexico" (Leyden, 1833); "Surinam in Bildern und Skizzen" (Amsterdam, 1835); and "Historia plantarum circa Havana sponte crescentium" (3 vols., Amsterdam, 1839).

[Wholly fictitious. It may be remarked that Humboldt, whose acquaintance he is said to have made "in the United States in 1802," spent that year in the Andes; he did not visit the United States until May, 1804. The words "plantarum circa Havana crescentium," which reappear under "Nascher" below, and look reasonable enough, do not occur in the title of any botanical work.]

KJOEPING, Oläus (kyuh-ping), Swedish explorer, b. in Dalecarlia in 1741; d. in Soroe, Denmark, in 1809. He entered the Danish service as military surgeon, and was stationed for several years in the West Indies, also visiting Louisiana, Guiana, and New Spain. In 1796 he became rector of the academy of Soroe. His works concerning America, include "Beschreibung von Guiana" (Soroe, 1797); "Neueste Gemälde von Louisiana und Mississippi" (2 vols., 1792); "Prodromus florae, sistens enumerationem plantarum cellularium quas in insulas, Santo Domingo, Cuba, Sancti Thomae et Sancti Bartholomei a Kjoeping collectas describit" (Copenhagen, 1799); and "Anmärkningar om Planter af Cuba" (3 vols., 1807).

[Wholly fictitious. The name "Oläus" may have been suggested by that of Olof Swartz (1760–1818), the famous Swedish student of the West Indian flora, one of whose works bore the subtitle "Prodromus descriptionum vegetabilium maximam partem incognitarum quae sub itinere in Indiam occidentalem annis 1783–87 digessit" (Stockholm, Upsala, and Aboc, 1788). The list of islands in the title of the imaginary "Prodromus" of "Kjoeping" is reminiscent of such works as West's "Bidrag til Beskrivelse over Ste. Croix, med un kort Udsigt over St. Thomas, St. Jean, Tortola, Spanishtown og Crabeneiland" (Copenhagen, 1793) and Euphrasén's "Beskrifning öfver Svenska vestindiska ön St. Barthelemi, samt öarne St. Eustache och St. Christopher" (Stockholm, 1795), both of which contain accounts of plants.]

KOEHLER, Alexander Daniel (kuh-ler), German botanist, b. in Altenkirchen, Rügen island, 18 April, 1762; d. in Langen-

branden, Württemberg, 6 Dec., 1828. He inherited from his father an independent fortune, and occupied himself with botanical studies. A letter from Alexander von Humboldt, then in America, determined him to make that country the field of his studies for several years, and he went in 1801 to Santa Fé de Bogotá, and was for seven years a collaborator of José Mutis, the Spanish botanist. On his suggestion, Mutis established in 1801 an astronomical observatory in Santa Fé, and Kochler provided it with valuable instruments. After the death of Mutis in 1808, he resolved to finish part of the latter's work, and, going to Brazil, made a thorough study of the palm-trees of that country. The civil wars that desolated the northern part of South America at that time put a stop to his explorations, and, passing to Peru, he visited that country, studying also the political institutions of Chili before returning in 1816. He devoted the remainder of his life to the publication of the materials he had collected during his travels, and read several papers before the academies of sciences of Munich and Berlin, of which he was a corresponding member. He kept up also a correspondence with Humboldt, and furnished him with notes and information which the explorer utilized in the revised edition of his travels through America. Among his works are "Reise nach Brasilien" (Stuttgart, 1817); "Wanderungen in Peru und Chile" (2 vols., 1818); "Karte von dem panamischen Isthmus" (Munich, 1821); "Flora Brasiliensis" (4 vols., Berlin, 1821-'3); "Flora Venezuelensis" (4 vols., 1822); "Studien über den öffentlichen Unterricht in Chile" (Stuttgart, 1823); "Reisen durch Nordwest-Venezuela" (Leipsic, 1824); "Genera et species palmarum" (Stuttgart, 1825); "Sertum Peruanum" (2 vols., Berlin, 1826); "Institutiones botanicae" (Stuttgart, 1827); and "Conspectus polygalorum florae Brasilicae meridionalis" (2 vols., Berlin, 1827).

[Wholly fictitious. Some of the bibliography given was evidently suggested by certain publications of Martius (1794-1868) and of Saint-Hilaire (1799-1853), but the titles modified and dates altered.]

LOTTER, Frederic August, German botanist, b. in Kleinaupe, Moravia, in 1741; d. in Gotha in 1806. He studied in Prague, and in 1789 was attached as botanist to the expedition that was sent by the Spanish government around the world under command of Capt. Malaspina. Lotter being taken sick in Concepcion, Chili, was unable to accompany the expedition.

He rejoined it at Acapulco in 1791, but soon left it again and explored the interior of Mexico as far as Lower California. Afterward he visited Peru, Chili, and the Argentine provinces, returning in 1795 to Europe, where he became professor of natural history at the College of Gotha. He published "De Usu et ratione experimentorum in perficiendi historia naturali" (Prague, 1787; revised and enlarged ed., Gotha, 1796); "Vermium fluvi-alum Americanarum, sive animalium infusorium helminthorum et testaceorum historia" (Gotha, 1796); "Flora Mexicana" (2 vols., 1798); "Flora Peruana" (2 vols., 1800); "Reisen durch Mexico und Süd-Amerika" (2 vols., 1801); "Compendium plantarum sponte crescentium circa Conceptium in quo familiae per tabulas disponuntur" (2 vols., 1802); "Icones plantarum Americanarum rariorum" (2 vols., 1803); and several less important works.

[Wholly fictitious. The botanists of the Malaspina expedition were Thaddäus Haenke and Luis Née.]

MORTIER, Edouard Louis (mor-te-ay), French naturalist, b. in Mulhouse in 1801; d. in Rio Janeiro in 1852. He was sent in 1835 on a scientific mission to South America, and explored the Guianas, the United States of Colombia, Venezuela, Peru, and Brazil, returning to France in 1840. In 1843 he settled in Brazil, and became professor of botany and natural history in the College of Rio Janeiro, which post he held till his death. He published "Des origines des Indiens habitant l'Amérique du Sud" (Paris, 1841); "Traité du tabac et du cacao" (1841); "Historia plantarum circa Cayenne sponte crescentium" (1843); "Prodomus florae Brasilicae, sistens enumerationem plantarum cellularium quae in insulâ Santa Catilina crescent" (2 vols., Rio Janeiro, 1849); "Historia generalis plantarum Americanarum in qua familiae per tabulas disponuntur" (2 vols., 1850); and several other works.

[Wholly fictitious.]

NASCHER, Friedrich Wilhelm (nash'-er), German naturalist, b. in Newent, England, in 1702; d. in Paderborn, Westphalia, in 1764. He was a merchant, resided several years in Havana, and, having made a fortune, followed his taste for travel, visiting Brazil and most of the Spanish possessions. On his return to Germany in 1752 he obtained employment at the court of the Prince of Reuss-Greiz, but, resigning a few months later, devoted the remainder of his life to the arrangement and publication of the material he had collected during his travels.

He published "Reisen in Südlichen Amerika" (2 vols., Dresden, 1754); "Neueste Reisen durch Amerika" (2 vols., 1755); "Grund-
 lehren der Anatomie und Physiologie der Pflanzen" (2 vols.,
 Berlin, 1756); "Neueste Geschichte und Beschreibung des Brod-
 baums" (1758); "Flora Cubana, exhibens characteres generum
 et specierum plantarum circa Havana crescentium" (2 vols.,
 Leipsic, 1758); "Cryptogamae Brasilienses ab Nascher collectae,
 cui additus lexicon in quo terminis artis breviter exponuntur"
 (1760); "Bilder und Skizzen der Umgebungen von Havana"
 (Berlin, 1762); "Land und Leute der Insel Cuba" (1762);
 and several other works.

[Wholly fictitious. Comments upon some of the titles are
 given above under "Kehr" and "Kerckhove." One title was
 evidently suggested by Forster's "Geschichte und Beschrei-
 bung des Brodbaums" (1784), but why a "German naturalist"
 who resided and traveled in the American tropics should have
 written upon such a subject in 1758 does not appear. The
 breadfruit tree is widely distributed in the islands of the Pacific,
 but was first introduced into tropical America in 1793; an
 expedition sent to the Pacific by the British government suc-
 ceeded in landing living trees at St. Vincent and Jamaica in
 that year.

NEÉ, Isidore Charles Sigismond (nay), West Indian botanist,
 b. in St. Martin, W. I., in 1784; d. in Paris, France, in 1837.
 He received his education in New Orleans, returned in 1808 to
 the West Indies, and in the spring of 1810 went to South America.
 After visiting Guiana and the important cities of Brazil, he sailed
 for Lima, explored the Andes, and ascended the volcanoes Pichin-
 cha and Chimborazo. In 1814 he went to Mexico, where he
 sojourned several years, devoting his time to researches in librar-
 ies. He then settled in France and published "Flora Mexicana,
 seu genera et species plantarum quæ in Mexico Crescent"
 (2 vols., Paris, 1827); "Les volcans des Andes de l'Equateur;
 une ascension du Pichincha et du Chimborazo" (1829); "Mémoire
 sur les hiéroglyphes Mexicains" (1830); and "Etudes sur l'analo-
 gie de l'écriture cunique et des hiéroglyphes Egyptiens et Mexi-
 cains" (1832).

[The name is evidently in part compounded from those of
 Carl Sigismund Kunth (1788-1850) and Luis Née, both well-
 known botanists; but the rest of the sketch is wholly fictitious.]

RAMÉE, Stanislas Henri de la (rah-may), French naturalist, b. in Périgueux in 1747; d. in Fontainebleau in 1803. He studied medicine and botany in Toulouse, and at the age of twenty had formed a valuable herbarium of the flora of Languedoc, when he went to Paris to study under Buffon, whom he assisted for several years in the Royal botanical garden. In 1783 he was sent to Peru to study the effects of cholera, which then was raging in Callao, and he visited afterward the Andes of Peru, Central America, the Isthmus of Panama, Cuba, and several of the West Indies, returning with valuable collections in natural history. His works include "Nova Systema Naturae" (2 vols., Paris, 1792); "Monographie des drogues et médicaments simples de l'Amérique du Sud" (1794); and "Prodrome des plantes recueillies en Amérique et dans les Indes Occidentales" (1798).

[Wholly fictitious.]

SYLVIE, Édouard (sil-vee), French naturalist, b. in Riom, Auvergne, in 1670; d. in Lyons in 1739. He studied in the College Louis le Grand at Paris, entered the church, and was appointed by the king to a rich abbey in Lyons. Devoting his leisure time to the study of mathematics and natural history, he presented several valuable memoirs to the Academy of sciences, which induced that body to propose him to the king for a mission to South America. Louis XIV. placed a man-of-war at Sylvie's disposal in order to facilitate his work, and from 1701 till 1703 he visited Santo Domingo and several ports of the Caribbean sea, prepared a chart of the Gulf of Mexico, and made valuable observations. In the following year he visited Guiana, Brazil, Montevideo, and Buenos Ayres, landed on Staten island, and made the ascent of its snowy range of mountains. Doubling Cape Horn, he coasted Chili and Peru to Callao, and, penetrating into the interior, explored the Andes. Sylvie afterward returned to the West Indies, and sojourned several months in Santo Domingo, occupied in drawing a map of the French part of the island. His vessel arrived at La Rochelle, 15 Oct., 1710, and Sylvie's valuable collections were presented to the Academy of Sciences, which elected him a corresponding member. His works include "Explications de l'herbier et des collections rapportées d'Amérique par l'Abbé Edouard Sylvie" (3 vols., Paris, 1711-'13); "Relation d'un voyage de la mer du Sud aux côtes de la Guiane, du Brésil, de la Terre des Etats, du Chili et du Pérou, avec une description de la côte septentrionale du détroit de Le Maire" (3 vols., 1714-16); "Voyage à travers le Golfe du Mexique, suivi d'une

description des îles Antilles de l'Amérique, et en particulier de l'île de Saint Domingue" (2 vols., 1720-'1); and "Journal des observations d'un voyage au Pérou et au Chili" (5 vols., 1726-'8).

[A much garbled account, with changes of names and dates, and distortion of other facts, of the life of Louis Feuillée (1660-1732), of whom a more or less reliable account appears in its proper place in the same cyclopedia.]

THIBAUDIN, Gaston Louis (tee-bo-dang), French explorer, b. in Dunkirk in 1727; d. in Lima, Peru, in 1796. He studied botany in Paris under Buffon, was employed afterward by the Academy of sciences, and at the request of that body was given by Louis XVI. in 1776 a mission to South America. His instructions were to collect in Chili, Peru, and Cuba specimens of medicinal plants that could be naturalized in France. He landed in Concepcion early in February, 1777, journeyed for months through the pampas and the mountains, and formed a rich herbarium. After visiting Santiago and the large cities, he went to Callao, making also a voyage to the island of Juan Fernandez. Toward the end of 1780 his herbarium numbered about 1,500 specimens, including many new ones, when he left for the West Indies, but, owing to the war that then raged in the Gulf of Mexico between France and England, he remained at Carthagena occupied in arranging his collections till the truce of 1782. Then he resumed his voyage and went to Havana, where he formed a nearly complete collection of the flora of the island. On his return to France in 1785 he was elected a corresponding member of the Academy of sciences, and that body undertook also the publication of his works. He had made many friends in Peru, and, feeling insecure in Paris during the revolution, he returned in 1792 to Lima, where he taught mathematics till his death. Thibaudin's works include "Description des plantes recueillies dans un voyage au Pérou et au Chili" (2 vols., Paris, 1786); "Mémoire sur la flore de l'île de Cuba" (1786); "Prodrome de la flore du Chili avec herbier explicatif" (4 vols., 1788); and "Prodrome de la flore du Pérou avec herbier explicatif" (4 vols., 1790).

[Wholly fictitious.]

VIVIER, Jacques du (veev-yay), French naturalist, b. in Lorient, France, in 1720; d. there in 1793. He studied botany in Paris, held an office in the laboratory of the Academy of sciences, and sailed as secretary of a commission that was sent to South America to measure an arc of the meridian under Charles

Marie de la Condamine. When the authorities of Lima induced some of the mathematicians to stay in South America, Vivier remained with Jean Godin, was employed in opening sulphur-mines at Cochabamba, and held for some time the chair of botany and mathematics in the College of Lima. In 1781 he obtained permission to return, and he embarked at Cayenne in 1782. On his arrival at Paris he vainly sought to recover his former place in the laboratory of the Academy of sciences, and for some time lived in poverty, until he obtained a place in the library of the Duke of Penthièvre. His published works include "*Nova genera et species plantarum quas in America, Jac. Vivierus collegit*" (3 vols., Paris, 1788-'90) and "*Sertum Peruanum*" (2 vols., 1792); and his manuscripts contain a "*Flora chilensis*," which has never been published.

[Wholly fictitious. It may be noted that this extraordinary man, who was born in 1720, was secretary of the La Condamine astronomical expedition, which went to South America in 1736! It is also a bit remarkable that, upon his return from Peru to Europe, he embarked at Cayenne!]

WALLERTON, Charles Louis Auguste, French naturalist, b. in Sainte-Ménéhould in 1721; d. in Nancy in 1788. He was sent to Mexico in 1759 to study the botany of that country, at the suggestion of the Academy of sciences of Paris, and obtained a special privilege to enter the Spanish dominions. Landing in Vera Cruz in October, 1760, he explored the province of Michoacan, where he formed a rich herbarium of medicinal plants, and afterward he searched the public libraries and the convents for information about the remedies that were formerly used by the Aztecs. He then visited the Isthmus of Panama, Santo Domingo, and Cuba, and made a thorough exploration of the latter island. On his return to France in 1765, with an herbarium of 1,500 medicinal plants, he was elected corresponding member of the Academy of sciences, and secretary of the Academy of Nancy, where he settled. He wrote "*Traité explicatif d'un herbier de plantes médicinales recueillies dans un voyage à la Nouvelle Espagne, dans l'isthme de Darien et à l'île de Cuba*" (3 vols., Nancy, 1767-'70); "*Monographie des maladies syphilitiques et des simples en usage chez les anciens Indiens du Mexique*" (1770); and "*Tableau de la flore du royaume de la Nouvelle Espagne, et en particulier de la province de Mechoacan*" (2 vols., 1775-'9).

[Wholly fictitious.]

The element of sameness that characterizes these accounts, not conspicuous when scattered through the volumes of the cyclopedia, but very evident when they are brought together as has been done here, is an added proof, if any were needed, of their spurious character.

And here we have a detailed enumeration of 69 titles, or 125 volumes in all, of important—some, indeed, monumental—works on America, not one of which is to be found in any of the great libraries of the world. Surely further comment is superfluous.

JOHN HENDLEY BARNHART.

ADDISONIA: ITS PROGRESS AND PUBLICATION

The second part of the fourth volume of the beautiful quarterly publication, *Addisonia*, devoted in accordance with the terms of the bequest of its founder, Judge Addison Brown, to the illustration by colored plates of the plants of the United States and its territorial possessions and of other plants flowering in the New York Botanical Garden or its conservatories, appeared in June. Each part of the work contains ten colored plates, and the total number of plates issued is now one hundred and forty; they are accompanied by descriptive letter-press. Miss Mary E. Eaton has made nearly all of the paintings reproduced and has also painted some four hundred plants not yet published, the illustrations required for another ten years of the journal being thus in hand.

Judge Brown's bequest contains the provision that the work is to be aided by subscriptions. These subscriptions by libraries and individuals now number about 240 at ten dollars annually, and thus yield about \$2,400 a year; the income of the Addison Brown fund, established by the bequest, is about \$900 per year, and sales of back volumes yield about \$300 a year. The annual income is thus about \$3,600 and up to the present time this has been sufficient for the publication. Recently, however, the

cost of engraving and of printing have both advanced, and additional subscriptions will be welcomed. A condition of subscription is that it must be made for the whole work commencing with volume 1, and thus requiring an initial cost of \$40 at the present time.

Sample copies of the work, which is an ornament to any library, will be mailed on application to the Director-in-Chief. There are also available a considerable number of loose plates which may be distributed.

N. L. BRITTON.

AUTUMN LECTURES, 1919

The following program of public lectures has been announced for the autumn of 1919. As usual, they will be held in the lecture hall of the Museum, Saturday afternoons at four o'clock.

August 30. "The Proper Care of Shade Trees and Ornamental Plants," by Dr. Mel T. Cook.

Sept. 6. "Sugar and Cocoa: Their History and Production," by Dr. W. A. Murrill.

Sept. 13. "A Naturalist's Rambles in Florida," by Dr. G. Clyde Fisher.

Sept. 20. "Dahlias and Their Culture," by Dr. M. A. Howe. (Exhibition of Dahlias, Sept. 20 and 21.)

Sept. 27. "Peeps into Gardens," by Mr. Leonard Barron.

Oct. 4. "Autumn Coloration," by Dr. A. B. Stout.

Oct. 11. "The Digestion of Vegetable Foods," by Dr. W. J. Gies.

Oct. 18. "Fall Planting and Winter Protection," by Mr. Geo. V. Nash.

Oct. 25. "Conserving the Forests and Wild Life of New York State," by Mr. C. G. Abbott.

Nov. 1. "The Tea Gardens of Ceylon and Japan," by Dr. H. A. Gleason.

NOTES, NEWS AND COMMENT

The Horticultural Grounds were gay during the late summer with an attractive display of many varieties of cannas, bordering

the entrance walk from Southern Boulevard. Beyond them the paths were banked with a large collection of gladioli at the south and perennial phlox at the north, while the eastern end of the area was marked by the mallow garden, which bloomed very well, although newly transplanted into this position. The dahlia collection near the railway station began to bloom early in August and from that time on attracted numerous visitors.

A summer flower show, under the direction of the Horticultural Society, was held in the Museum, August 23 and 24. The leading feature was the display of gladioli, but considerable space was also occupied by cannas, roses, and dahlias.

The three flagpoles at the Garden, in front of the Museum and the Mansion, have received a fresh coat of white paint and gold leaf.

Minor depredations in the grounds have been as numerous as ever this summer in spite of many arrests. Conditions have been especially trying along the Pelham Parkway boundary, which is not protected by a fence.

Prof. E. W. D. Holway, of the University of Minnesota, well known to mycologists through his extensive work on plant rusts, called at the Garden recently on his way to South America, where he expects to spend several months collecting rusts and other plants in Chile and Argentina.

Dr. J. K. Small, Head Curator of the Museum, has recently made two trips into Perry County, Pennsylvania, to secure living plants and photographs of the rare huckleberry, *Gaylussacia brachycera*. The species is known to exist in only two localities, the second being in Delaware. In the Pennsylvania station, the plants extend over an area of several acres, with the stems connected underground, so that the whole assemblage may justly be called a single plant. From Dr. Small's collections Miss M. E. Eaton has made paintings, which will be published in *Addisonia*.

Mr. George V. Nash, Head Gardener, lectured on "Rose Gardens" before the Rumson Garden Club, Rumson, New Jersey, August 5.

Meteorology for July.—The precipitation for the month at the New York Botanical Garden was 4.44 inches. The maximum temperatures recorded for each week were 100° on the 4th and 5th, 85° on the 8th and 14th, 93° on the 27th, and 96° on the 28th. The minimum temperatures were 54° on the 9th, 64° on the 15th, and 60° on the 26th and 30th.

Work on the new coal bunkers at Power-house 1 has been pushed through the summer and they will be ready to receive coal during the autumn delivery. They are built with masonry walls and reinforced concrete roof, and approximately quadruple the storage capacity at the power-house. All the work has been done by Garden employees, under the direction of Superintendent A. J. Corbett.

Dr. A. D. Cotton, plant pathologist of the Board of Agriculture, London, and formerly in charge of the collection of algae at the Royal Gardens, Kew, visited the Garden August 16 and gave much interesting information relative to botanical and horticultural conditions in England. It was satisfactory to learn that neither has been seriously restricted on account of the war, but sad to know that a number of highly promising young men had been killed in action, and these it is impossible to replace.

A large collection of herbarium specimens made by Mr. W. C. Fishlock, agricultural instructor for the British Virgin Islands, on the islands Tortola, Virgin Gorda, and Anegada has recently been received and studied at the Garden. It adds much to our knowledge of the distribution of species occurring also in the American Virgin Islands and in Porto Rico, and comes in good time to have this information included in the botanical part of the reports on the scientific survey of Porto Rico and the Virgin Islands for publication by the New York Academy of

Sciences. Mr. Fishlock aided Dr. Britton greatly during his visit to these islands in the spring of 1913 (*Journal*, 14: 100-102).

Mr. C. G. Lloyd, of Cincinnati, spent several days at the Garden in August and September examining species of *Xylaria* in the Garden collection in connection with his studies of that genus.

The following visiting botanists have recently enrolled in the library: Professor Howard J. Banker, Cold Spring Harbor, N. Y., Professor Homer D. House, Albany, N. Y., Mr. G. W. Martin, New Brunswick, N. J., Professor E. W. D. Holway, Minneapolis, Minn., and Professor John W. Harshberger, Philadelphia, Pa., with his class in botany at Cold Spring Harbor.

Members of the New Rochelle Garden Club visited the Garden on the afternoon of August 11 and were accompanied on their tour of inspection by Dr. and Mrs. Britton, Dr. Howe, and other members of the Staff. The dahlia border was first inspected, and Dr. Howe gave a brief talk on the selection and cultivation of dahlias, which was followed by questions and discussion. Then the tender and hardy water-lilies in the tanks at Conservatory Range 1 were examined and admired; after which the party visited the display borders of cannas, gladioli, and phlox, and the new Rose Garden. Mrs. Richards, the president, called a meeting of the club at the Mansion at 4 P.M., at which twenty members were present, most of whom remained to see the experiments in plant-breeding being conducted near the Propagating Houses by Dr. Stout.

Dr. W. A. Murrill spent a part of his vacation in July collecting and making field studies of fleshy fungi in the mountains of Virginia, where an unusual number were brought out by the heavy and continuous rains. He also experimented with certain attractive forms for table use. All the way from New York to southwest Virginia, the black locust was found to be badly attacked by a leaf-miner; while the chestnut canker continued to

spread southward and westward; and wilts of tomatoes and other vegetables and rots of plums, peaches, and grapes were abundant and destructive owing to the damp weather. At Lynchburg, a splendid English walnut tree, over a hundred years old, was attacked by a fruit blight which practically destroyed the crop, the ground being covered with blackened and worthless nuts. In the vicinity of Washington, seventeen-year locusts had been abundant, especially on the oaks, and many trees used in decorative plantings had been rendered very unsightly by the death of twigs where eggs had been deposited. Fortunately for us, this insect seems to have skipped Manhattan and The Bronx, although singing this season in twenty states.

About seventy students of the Columbia Summer School visited the Garden on the afternoon of August 8, under the leadership of Mr. L. W. Crawford, Jr., and were escorted through the grounds and buildings by Drs. Murrill, Howe, Barnhart, and Pennell, of the Garden Staff.

Chicago is soon to have, on the outskirts of the city, the most beautiful and extensive botanical gardens, or arboretum, in the world. The Cook County board of forest preserve commissioners decided yesterday to utilize a part of the forest preserve for this purpose. It is likely that 2,000 of the 4,000 acres of the Palos preserve district, southwest of the city, will be chosen as the site.

Already a garden spot, with its deep wooded ravines, its high bluffs overlooking the Desplaines River valley, and its great stretches of green prairie, the Palos district offers a nucleus, in the opinion of the board, from which may be made a scenic marvel where the scientist may revel in botanical wonders while the layman revels in its beauty.

The site, recommended by a subcommittee, of which Prof. Henry Cowles of the University of Chicago and Prof. Chas. B. Atwell of Northwestern University are members, is already 30 per cent. complete, scenically. As trees, shrubs, and flowers from other parts of the world are added, they will be planted in accord with a comprehensive scheme of landscape gardening.

Eventually, greenhouses will be built to grow verdure which otherwise could not exist in this climate. The plans of the commission also call for the ultimate erection there of a museum and a library.

Charles F. Millsbaugh, director of the Field Museum, who has visited all but two of the arboretums of the world, after seeing the Palos site declared that Chicago has an opportunity such as no other city has in having such a great area of land near its borders suitable for an arboretum.—*Chicago Tribune*.

ACCESSIONS

LIBRARY ACCESSIONS FROM APRIL 22 TO AUGUST 21, 1919

- ADV, JULIA (CARTWRIGHT.) *Italian gardens of the Renaissance*. New York, 1914.
- ALLEN, CHARLES LINNAEUS. *Bulbs and tuberous-rooted plants*. New York, 1919.
- ALLEN-BROWN, A. & D. *The violet book*. London, 1913.
- American botanical and horticultural magazine*. Vol. 1, numbers 1, 2. New York, 1842. (Given by Mrs. Henry Parsons.)
- Annals of science*. Vol. 1, 2. Cleveland, 1853-54. (Given by Dr. Arthur Hollick.)
- ARNOTT, SAMUEL. *The book of bulbs*. Ed. 2. London, 1914.
- BAILEY, LIBERTY HYDE. *Manual of gardening*. New ed. New York, 1918.
- BAILEY, LIBERTY HYDE. *The pruning-manual*. New York, 1919.
- BARDSWELL, FRANCES ANNE. *The book of town and window gardening*. London, 1903.
- BARNES, PARKER THAYER. *The suburban garden guide*. New York, 1913.
- BARRY, PATRICK. *Barry's fruit garden*. New ed. New York, 1911.
- BARTRUM, EDWARD. *The book of pears and plums*. London, 1903.
- BEATTIE, WILLIAM RENWICK. *Celery culture*. New York, 1910.
- BRITTON, NATHANIEL LORD, & ROSE, JOSEPH NELSON. *The Cactaceae: descriptions and illustrations of plants of the cactus family*. Washington, 1919. (Given by Dr. N. L. Britton.)
- BURBIDGE, FREDERICK WILLIAM. *The book of the scented garden*. London, 1905.
- BURRITT, MAURICE CHASE. *Apple growing*. New York, 1912.
- BUTTERFIELD, W. H. *Making fences, walls and hedges*. New York, 1914.
- CABLE, GEORGE WASHINGTON. *The amateur garden*. New York, 1914.
- CARD, FRED WALLACE. *Bush-fruits*. New ed. New York, 1919.
- CARLETON, MARK ALFRED. *The small grains*. New York, 1919.
- CASTLE, R. LEWIS. *The book of market gardening*. London, 1906.
- CHEYNEY, EDWARD GHEEN, & WENTLING, JOHN PHILIP. *The farm woodlot*. New York, 1915.
- CHILDS, JOHN LEWIS. *Popular bulbs and their culture*. Rochester, 1890. (Given by Dr. J. H. Barnhart.)

- CLUTTON-BROCK, ARTHUR. *Studies in gardening*. New York, 1916.
- COBURN, FOSTER DWIGHT. *The book of alfalfa*. New York, 1918.
- COIT, JOHN ELIOT. *Citrus fruits*. New York, 1917.
- COOK, THOMAS H., DOUGLAS, JAMES, & MCLEOD, JAMES FINLAY. *Carnations and pinks*. New York, [1911] (Given by Dr. J. H. Barnhart.)
- CURTIS, CHARLES HENRY. *The book of the flower show*. London, 1910.
- CURTIS, CHARLES HENRY, & GIBSON, W. *The book of topiary*. London, 1904.
- DONDLINGER, PETER TRACY. *The book of wheat*. New York, 1919.
- DOOGUE, LUKE J. *Making a lawn*. New York, 1917.
- DUGGAR, BENJAMIN MINGE. *Mushroom growing*. New York, 1915.
- DUNCAN, FRANCES. *Home vegetables and small fruits*. New York, 1918.
- DUNCAN, FRANCES. *The joyous art of gardening*. New York, 1917.
- ELY, HELENA RUTHERFURD. *The practical flower garden*. New York, 1916.
- FISH, D. S. *The book of the winter garden*. London, 1906.
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H. A. GLEASON

First Assistant



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COASTWISE DUNES AND LAGOONS

A RECORD OF BOTANICAL EXPLORATION IN FLORIDA IN THE
SPRING OF 1918

[WITH PLATES 236-238]

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: With your approval I devoted several weeks of April and May, 1918, to botanical exploration and investigation in peninsular Florida, and at your request incidentally helped in securing paintings of plants of the Florida flora for illustration in *Addisonia*. I was accompanied to Miami by Mrs. Small and Elizabeth Small, who attended to the drying of herbarium specimens. At your suggestion, moreover, Miss Mary E. Eaton, artist at the Garden, accompanied us for the purpose of making the paintings above referred to.

Our collecting headquarters were maintained in the laboratory building of the Plant Introduction Garden of the United States Department of Agriculture with the permission of Dr. David Fairchild, and we had the coöperation of Mr. Edward Simmonds, the officer in charge of that station.

All facilities for field work, and for painting as well, were generously put at our disposal by Mr. Charles Deering, who was at personal pains to further our work on every occasion.

Considerable time was consumed in selecting and gathering specimens for painting. For the most part, only those kinds of plants not previously illustrated were selected. As a result of Miss Eaton's rapid and steady work, however, not less than

twenty-eight full-page paintings were secured, or, about an equivalent of one painting a day while she was in the field. Only flowering plants were illustrated, including two species of monocotyledons and twenty-six species of dicotyledons. Altogether, they represent twenty natural plant-families and twenty-six genera. Most of the plants illustrated are rare or local in our flora, while four of them are species new to science. Viewed geographically, the four novelties, and thirteen other species, are endemic in Florida; eleven kinds grow also in the West Indies and in Mexico; while two in the latter category range well down into South America.

While gathering specimens for painting from the vicinity of Miami, studies on various problems, begun in previous years, were continued. Investigations among the Florida cacti were continued in our field-work, particularly in connection with problems arising through the monographic work of yourself and Dr. Rose for the Carnegie Institution of Washington.

In passing, it may be of interest to state that several years ago we knew of but seven species of cacti in Florida, these being referred to two genera, four to the genus *Opuntia* and three, of uncertain relationship, to the genus *Cereus*. Our information of this group has so increased, however, that today we have definite knowledge of twenty-four species, these clearly constituting seven genera.

Twelve of these species are flat-jointed and represent the genus *Opuntia*, or prickly pears; while the remaining twelve are of the columnar or climbing kinds and comprise the six other genera. These latter are *Selenicereus*, with two species; *Hylocereus*, with one species; *Acanthocereus*, with one species; *Harrisia*, with five species; *Cephalocereus*, with two species; and *Pereskia*, with one species.

It should be mentioned that this record speaks well not only for the field work done, but for the opportunities afforded by the cactus-plantation in the reservation of Mr. Charles Deering at Buena Vista, Florida. Here we have been able to bring together, grow, and study all the known cacti not of Florida alone, but of the entire eastern United States.



Fantastic woody roots occur in some of the hammocks of the Everglade Keys. The one here illustrated is in the Deering hammock at Cutler and stands about three feet high. It is connected with a pond-apple tree (*Annona glabra*) that stands about ten feet away from it. The particular reason for this aerial section of the root is not apparent.



Stilted trees are common in the hammocks of the Everglade Keys. The roots grow directly on the rock which lies beneath a rather thin layer of humus. The pigeon-plum tree (*Coccolobis laurifolia*) here illustrated is in the Deering hammock at Cutler. Such cage-like structures make ideal homes for wild rodents, and doubtless were used by the Florida-lynx which was plentiful in this hammock until a quite recent date.

A day was devoted to Royal Palm Hammock and the adjacent Everglades.

Here the custodian showed us a peculiar vine he had recently found. It was in both flower and fruit and proved to be a heliotrope-relative (*Tournefortia hirsutissima*). Thus Royal Palm Hammock becomes the second known locality in Florida for this tropical plant, Mr. Mosier and the writer having found the same plant several years ago—in leafage only, however—in the Timms Hammock in the Biscayne Pineland. It is a somewhat woody and very vigorous grower, climbing into the tallest trees and copiously branching. It bears large clusters of rather small white or cream-colored flowers of a pleasing fragrance, which later develop into clusters of globular fruits. These fruits are from a quarter to a half-inch in diameter and resemble large pearls.

While on the subject of the Royal Palm Hammock, it may be remarked that both this and the Deering Hammock at Cutler exhibit an exceptionally large number of what might be called “stilted” trees—that is to say, trees, either small or large, the trunks of which are elevated on a conoidal structure of exposed roots. The reasons for this are local.

It appears that when the tree starts as a seedling the roots of necessity spread out horizontally, or nearly so, in the almost pure humus which takes the place of soil over the rough rock floor of the hammocks, and that some of the main roots grow close to or against the rock. Now, under favorable conditions of temperature and moisture, it would appear that these roots grow too fast to adjust themselves to the subsurface irregularities, as they naturally would in ordinary soil. Hence the pressure against the obstructing rock causes the trunk to be pushed up vertically. The process continues. The early roots put out branches and new roots are formed, and these gradually elevate the base of the trunk, sometimes to a height of two or three feet. Incidentally, the cage-like structures with sides at an angle of 45°, which are thus formed by the exposed roots, are extensively used as houses by rodents. (See accompanying plate.)

In this connection, there is one remarkably fantastic root in

the Deering Hammock at Cutler. It is that of a pond apple tree (*Annona*), but it appears far from the trunk of this. Either it encountered an obstruction or grew with such exceptional rapidity in one direction that it left the ground altogether and started up into the air. There it curved about, finally forming a cage-like structure fully a yard high and quite isolated from other shrubs or trees. (See accompanying plate.)

The occurrence of the mangrove (*Rhizophora Mangle*) near Royal Palm Hammock¹ has already been recorded. Additional specimens have been found a short distance from the hammock. They are vigorous and are even spreading in spite of prairie fires. They grow in absolutely fresh water, being situated not only twelve miles from the Bay of Florida, but in a place where the superficial flow and the underground pressure of the water from the Everglades is directly against the possibility of the presence of salt water.

On another day we made an excursion to Hammer Key, a high hammock island lying in the Everglades about fifteen miles southwest of Royal Palm Hammock. To reach this we traversed a prairie on which both showy and inconspicuous orchids were plentiful—respectively, the grass pink (*Limodorum*) and ladies'-tresses (*Ibidium*). More conspicuous than all the other plants, however, was the yellow heliotrope (*Heliotropium Leavenworthii*) which grew by the acre, and with it were bright-red milkweeds (*Asclepias*), low milkworts (*Polygala*), marsh pinks (*Sabbatia*), diminutive bladderworts (*Utricularia*), and butterwort (*Pinguicula pumila*).

Midway on our journey we crossed Burnt-Pine Island—a well-named locality, for there was nothing left of it but a ragged reef with some blackened poles standing here and there. This was once an outlying Everglade Key; but the prairie fires that are largely started by the mighty hunters that infest the region have wiped it off the map. Whatever broad-leaved shrubs and trees, not to mention herbaceous vegetation, that once clothed the island have been utterly destroyed, and except for the charred poles the area has reverted to mere everglade-prairie.

¹ R. M. Harper in *The Florida Review* 4: 154, 155. 1910.

Farther on, small rocky reefs isolated in the Everglades indicated the position of former hammocks. (See accompanying plate.) These, evidently once clothed with shrubs and trees growing in the accumulated humus, are now bare ragged rock nearly or quite devoid of even the common everglade vegetation.

Burnt-Pine Island, Hammer Key, and neighboring hammock islands, both extant and extinct, are interesting as indicating a natural chain of connection between the Cape Sable region and the main body of the Everglade Keys. When the territory for a dozen miles on either side of the Dade-Monroe county line becomes accessible, the gradation between the floras of the Everglade Keys and Cape Sable, as well as the relation of both of these floras to that of the lower Florida Keys, to which they are both related, will doubtless present many interesting problems.

Although Hammer Key is widely separated from the Long Key Pineland, and is surrounded by the Everglades, it is not an Everglade hammock, but is almost identical with the high pineland hammocks of the Everglade Keys. It is on an elevated rocky foundation. Many of the typical high-pineland hammock trees are there, the wild tamarind (*Lysiloma*) and butter-bough (*Exothea*) being very abundant. The characteristic shrubs, vines, and herbs also grow there.

Unfortunately, a drenching rain came up before we reached the Key and continued with more or less severity until we got back to Royal Palm Hammock. We and our luggage were thoroughly drenched, except our camera. This, of course, we had to protect at the expense of everything else, even if it was useless baggage just then.

During a general and extensive collecting trip into the northern part of the lake region an attempt was made to get into the district west of Lake George for the purpose of rediscovering a prickly-pear reported from there many years ago.

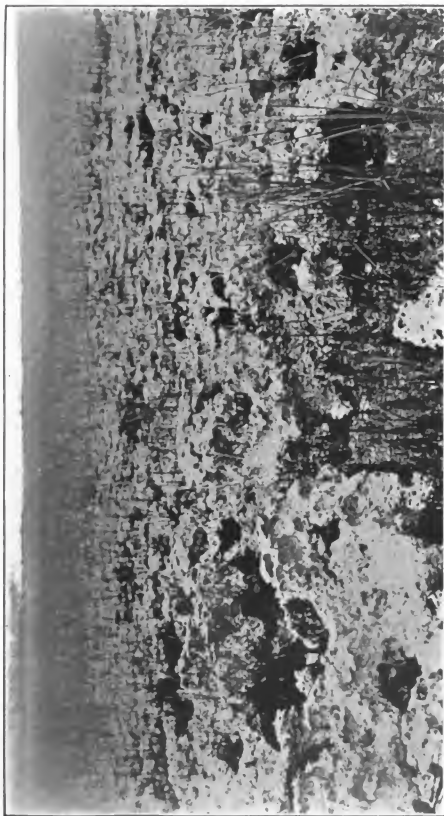
We drove from Miami to Daytona on or near the border line between two different plant regions, the "east coast strip" and the "south Florida flat-woods." The former region comprises the line of narrow more or less active sand-dunes along the eastern coast of the state, the lagoons, and perhaps some of the adjacent

mainland. Our route lay on the western side of the lagoons, the larger ones of which are Bay Biscayne, Saint Lucie Sound, Indian River, Halifax River, Banana River, and Mosquito Lagoon.

The waters of the lagoons are salt, brackish, or nearly fresh, depending upon the feeders, the inlets from the ocean, and the tide. Their plant life is usually not conspicuous, but it is often abundant. The principal plants are submerged, ditch-grass (*Ruppia*), horned pondweed (*Zannichellia*), naiad (*Najas*), partly emersed pondweed (*Potamogeton*), and arrowhead (*Sagittaria*). The most conspicuous plant is the cat-tail (*Typha*), which often grows luxuriantly and tall.

The active dunes, which result from the wind-shifted sands of the barrier beaches, extend as a comparatively narrow strip along most of the eastern coast. They are partly clothed with hammock, both open and dense, the growth ranging from knee-high in exposed wind-swept places to tall forest trees in more sheltered places. Besides the hard-wood trees and shrubs, practically all of which are evergreen, there is often a copious growth of palms, particularly the cabbage tree (*Sabal Palmetto*), saw palmetto (*Serenoa serrulata*), and at the southern end of the dunes the silver palm (*Coccothrinax argentea*). Two cycads, the so-called coontie or comptie, occur on the dunes. On those of the northern portion we find *Zamia pumila*, while at the southern end is *Zamia floridana*. Of course there is, as well, an extensive herbaceous flora.

On the western side of the lagoons we find principally pine-woods, "scrub," and hammock. These three plant formations abut, for varying distances, directly on the water, except near the southern part of the region, where in some places there are extensive marshes between the higher land and the lagoons proper. In the southern portion, too, the land is quite low and we find tropical shrubs and trees in abundance. At the extreme southern end on the mainland, as well as on the dunes, we have extensive growth of the red mangrove. On the higher land, for example the Brickell Hammock at Miami and the Deering Hammock at Cutler, we have an almost pure growth of typically



A "reef" in the Everglades southwest of Royal Palm Hammock. Such "reefs" represent the sites of former hammocks which have been destroyed as a result of prairie fires, which arise either naturally or through vandalism. In that region one may see hammocks in all grades of devastation. The ragged condition of the limestone is the result, apparently, of the leaching of the softer parts of the rock by water charged with the acids of decomposing vegetable matter percolating through it. A few young stalks of saw-grass (*Mariscus jamaicensis*), the dominant plant of the Everglades, may be seen in the foreground.

tropical shrubs, trees, and herbs. More conspicuous among these are the red mangrove (*Rhizophora*), the white mangrove (*Laguncularia*), the black mangrove (*Avicennia*), and the dune-mallow (*Malache scabra*). Further north for long distances, the marshes disappear and the stationary sand-dunes, with various kinds of hammocks or pinelands, form the water-front. Most of these old dunes are clothed with a copious growth of the sand pine (*Pinus clausa*), and an association of scrub oaks (*Quercus*) and rosemary (*Ceratiola*).

This "scrub," or formation of stationary sand-dunes, turns away from the present coast line south of the source of the Saint John's River and extends up between the Kissimmee and Saint John's Rivers to the region west of Lake George, thus forming a kind of a divide.

At several places where the dunes rise abruptly from Saint Lucie Sound and the Indian River, we find very interesting hammocks, quite different from any others in the state. There we find a mixture of typically tropical shrubs and trees, apparently altogether out of place, and shrubs and trees characteristic of more northern regions. The tropical elements were brought northward long ago in some way and maintained there, evidently, by the proximity of the continuously warm water of the lagoons.

Among the tropical elements may be mentioned: strangling-fig (*Ficus*), pigeon plum (*Coccolobis*), caper tree (*Capparis*), wild lime (*Zanthoxylum*), gumbo-limbo (*Elaphrium*), butter-bough (*Exothea*), bitterwood (*Simarouba glauca*), torchwood (*Amyris elemifera*), lancewood (*Ocotea*), myrsine (*Rapanea*), marlberry (*Icacorea*), satinleaf (*Chrysophyllum*), fiddlewood (*Citharexylum*), and white wood (*Schoepfia*).

Among the northern elements are hickory (*Hicoria*), mock orange (*Laurocerasus*), and wild olive (*Osmanthus*).

This mixture is often striking, particularly when we find the hickory growing with mastic (*Mastichodendron*). Tropical cacti grew there also, the genera *Harrisia* and *Selenicereus* being represented by a species each.

Further north along the Indian River many hammocks that invited inspection were passed by for lack of time. North of

Titusville the hammocks change perceptibly and the live-oak and magnolia are the conspicuous trees. There, too, we found large shell-mounds, doubtless built by the aborigines, bordering the lagoons instead of sand-dunes.

Considering our course geologically, from Miami to Delray we had passed over the Miami oölite or the oölite covered with sand. From Delray to the estuary of the Saint Lucie River we traversed the Palm Beach limestone, mainly covered with sand; while thence to Daytona we traveled over the Pleistocene and recent geological formations.

After dark we entered historical country. As it happened our experiences in that region fell almost on the one hundredth anniversary of those of William Baldwin,¹ who describes his travels in a series of letters to William Darlington² in 1817. Speaking of New Smyrna, which town we passed through after sundown, he records a meeting with an ancient Minorcan, "one of those, who, more than half a century ago, were enticed from their native land, by the famous Dr. Turnbull,³—and experienced

¹ William Baldwin (1779-1819), a medical graduate of the University of Pennsylvania and a surgeon in the United States navy, was an enthusiastic student of the flora of the southern states. In 1805-06 he visited China, and in 1817-18, South America, but more than half of the last decade of his short life was spent in Georgia and neighboring states.—JOHN HENDLEY BARNHART.

² William Darlington (1782-1863) was a famous citizen of West Chester, Pennsylvania; physician, bank president, member of Congress, and enthusiastic student of the flora of Chester County. It is to him that we owe the preservation, in book form, of the literary relics of John Bartram, of Humphry Marshall, and of Baldwin.—JOHN HENDLEY BARNHART.

³ Dr. Andrew Turnbull, a Scotchman of considerable means, was the local manager, and one of the promoters, of the first land improvement scheme in Florida. He brought about 1500 settlers from the shores and islands of the Mediterranean to a tract of land granted by the British government; some were from Smyrna, and the settlement was named New Smyrna; others were from Minorca, and the name "Minorcans" was applied to all of them by their neighbors. Many miles of roads were constructed in the wilderness, and the cultivation of indigo and sugar-cane undertaken on a large scale. This was in 1767. It is said that more than \$150,000 was spent in this venture. The colonists were brought over under indentures which practically made them slaves for a term of years, and they claimed that they were cruelly treated by their overseers in Turnbull's absence; their indentures were finally canceled by the courts, the settlement at New Smyrna was abandoned in 1776, and the remaining 600 "Minorcans" were allotted home-sites at St. Augustine, north of the fort. Turnbull went to Charleston, and adhered to the cause of the colonies during the Revolution; in consequence of this, his New Smyrna grant was confiscated.—JOHN HENDLEY BARNHART.

nine years of slavery at New Smyrna." In a later letter regarding the old settlement Baldwin says: "The fertility of the soil, the beauty of the situation, and the extent of former improvements, far exceeded my expectation. The houses were all neatly built with those fine materials peculiar to the country; but naked walls and chimneys alone remain to mark the spot where New Smyrna stood. So luxuriant has been the vegetation, that it was difficult getting along, without cutting our way. Where the car of Turnbull once drove in triumph, we find cabbage trees fifteen feet in height."

On the morning of the second day we left Daytona and started for the middle of the peninsula, taking a southwesterly course towards De Land. We were soon on an entirely different geological formation, the Pliocene deposits. Most of the country was covered with a growth of pine trees, not by one species, however, but by at least three. In the flat woods the yellow pine (*Pinus palustris*) occurred, while on the sand-hills the sand pine (*Pinus clausa*) grew abundantly. In the lower and wet regions the black pine (*Pinus serotina*) was the conifer represented. The pools in many places were yellow with the flowers of several bladderworts, both small and large. In low hammocks rose bushes with stems and branches more than fifteen feet long clambered up into the shrubs and trees. There, too, the loblolly-bay (*Gordonia Lasianthus*), a relative of the tea plant, was conspicuous by its large white flowers. The wet banks were carpeted with violets (*Viola*), white and blue, and with the partridge-berry (*Mitchella repens*).

In and about many towns Drummond's phlox (*Phlox Drummondii*) had taken possession of the roadsides and waste places, particularly about De Land, where we passed into the lake region. It was just west of this town that we came to the Saint John's River.

Here the river swamp was a veritable flower garden, both as regards aquatics and terrestrials. The pools in the swamp were filled with a water milfoil (*Myriophyllum proserpinacoides*), an aquatic naturalized from Chile. The ground was carpeted, often densely so, with a beautiful, fragrant, depressed labiate

(*Micromeria Brownii*) with numerous pale lavender flowers. The trees were hung with vines of the trumpet creeper bearing numerous festoons of the bright-red trumpet-shaped flowers as well as clusters of the long persistent cigar-shaped pods.

A short distance beyond the Saint John's River we left the Pliocene behind and passed on to the Oligocene deposits, which comprise a rolling country mostly forested with the yellow pine (*Pinus palustris*) and with a scattering of scrubby hammock in the lower parts.

We went as far as Lake Eustis, on whose shores the spiderwort (*Tradescantia reflexa*) was growing in banked clumps. A showy-flowered and exceedingly conspicuous ruellia (*Ruellia parviflora*) was also there in abundance.

In the scrubby hammock were colonies of prickly pears (*Opuntia austrina*), this locality being the northernmost limit of the range of this species—a range which extends as far south as Cape Sable. Growing with it was the scrub palmetto (*Sabal Etonia*), a close relative of the cabbage tree, but with a short curved stem that never rises above the surface of the ground and bears edible fruits several times the size of those of the cabbage-tree, with a flavor resembling that of the date.

We had hoped to be able to get into the Lake George region from Eustis, but lack of time and proper roads and trails denied us this portion of the excursion.¹ After returning to Daytona over nearly the same route by which we had come, we went to the active dunes to collect living specimens of prickly pears (*Opuntia*) and the so-called coontie (*Zamia*). We found fine specimens of both of these, and they are now growing at Buena Vista, thus offering an opportunity for comparison with related species native in southern Florida. In addition to the above-mentioned plants and others of more or less interest, we found the Indian sweet clover (*Melilotus indica*) and a commonly cultivated blanket-flower (*Gaillardia*) extensively naturalized in the hammock.

On the way from Daytona to Miami we made collections of

¹ A special excursion to that region was made in December, 1918. It will be described in a subsequent number of this Journal.



On the sand dunes south of Palm Beach, Florida. Rock is of very rare occurrence on the dunes in southern Florida. The rock here illustrated is of the Palm Beach limestone and it is situated near the crest of a wide dune, but only a short distance from the ocean. In the background is a dense hammock of stunted tropical shrubs and trees. On the face of the rock and over the opening of a cavern are numerous aerial roots of a young strangling-fig (*Ficus aurea*).

plants at several localities along the highway. The shell-mounds between Daytona and New Smyrna were carpeted, in many places, with a very copious growth of the sweet clover referred to above. Another Old World plant, common in the North, but rare in the South, was the great mullein (*Verbascum Thapsus*).

The most conspicuous plant along the inland marshes was a wild verbena (*Verbena tampensis*) known only from middle peninsular Florida, with showy heads of very large bright bluish-purple corollas. Often associated with it was the leaf-cup (*Polymnia Uvedalia*), which is less frequently seen in Florida than in the more northern States.

In the swamps the great magnolia was beginning to bloom and the low places and ditches were decorated with a generous growth of the obedient-plant (*Dracocephalum denticulatum*) and a milkweed of the coastal plain (*Asclepias perennis*).

Further south, in the vicinity of the older settlements, particularly between Titusville and Fort Pierce, several exotics commonly cultivated were found perfectly naturalized. They had doubtless been growing naturally for many years in that region, wholly neglected by botanists.

In one hammock near Cocoa, for example, we found not less than nine naturalized exotics, more than half of which had not previously been recorded for the flora of Florida, or even for the flora of the United States. They are: a Brazilian pea tree (*Sesban punicea*), Cape leadwort (*Plumbago capensis*), a South American vervain (*Verbena chamaedraefolia*), a South American lantana (*Lantana Sellowiana*), white petunia (*Petunia axillaris*), Cape honeysuckle (*Tecomaria capensis*), two acanthus-relatives (*Thunbergia fragrans* and *T. alata*), and an Indian gourd (*Coccinia cordifolia*).

A thorough search would doubtless bring more introduced species to light. For about these old settlements where garden plants have been cultivated in the perpetual warmth resulting from the adjacent lagoons, many plants are bound, in one way or another, to get beyond the gardens, and those finding congenial surroundings continue to grow and spread without further attention.

Further southward we found a large-flowered and very showy mallow (*Hibiscus furcellatus*) growing abundantly on the shores of a high sand-dune near Eden. This plant was formerly thought also to be an introduced exotic, but there now seems to be little or no doubt that it is a native. On the same dune we discovered two tropical vines, the balsam-apple (*Momordica balsamea*) and a poke-relative (*Adgestis clematidea*). Both plants were very abundant and bore masses of both flowers and fruits.

Throughout this excursion we noticed remarkably little animal life, except birds and lizards, and cast-off skins of snakes (no live serpents). The lizards were exceedingly plentiful. They are locally known as chameleons on account of their form and their faculty of changing color. Baldwin, as well as Bartram,¹ had better success in observing animals, perhaps their mode of travel (not by automobile) was less exciting to the denizens of the forests and the prairies, all of which brings to mind several paragraphs in two of Baldwin's letters in which he wrote:

"One beautiful little *Lacerta bullaris* has made its appearance since I began to write. Like the Chamelion, this innocent little creature has the faculty of changing color. Could I only see a huge 'magnanimous' (Bartram) rattlesnake, it would help out my story very much. During 5 years that I have been in this southern country, I have seen but one living rattlesnake! But, had not Bartram been here before me, I would astonish you with my account of the Alligators.² I should like to wind up this interesting botanical letter with some notice of Insects—could I call them by names less vulgar than sand-flies, horse-flies, etc. which have been buzzing about me since I began to write."

Several weeks later he wrote:

"I had the pleasing horrible prospect of a living rattlesnake, six feet in length. He had the generosity, when unperceived by us, to give the dread alarm; but a sudden leap, I apprehend,

¹ William Bartram (1739-1823) was associated from childhood with the scientific work of his father, John Bartram (1699-1777), the first native American botanist. He accompanied his father to Florida in 1765, insisted upon remaining there, and settled as a planter on the St. John's River, where he stayed about two years. In 1772 he began the extensive journey in the Carolinas, Georgia, and Florida, reported in his published "Travels." He was a botanical artist of much enthusiasm and considerable ability.—JOHN HENDLEY BARNHART.

² Bartram is sometimes accused of drawing the long bow in regard to alligators.

alone saved my companion from feeling the full force of his magnanimity. Never have I seen any thing so awfully, so horribly terrific, as this rattlesnake in anger. Even the gigantic alligator, with his iron sides, and formidable tusks, ever grinning horribly, with ghastly smiles, bears in my estimation no comparison. The fangs of this reptile were double, and an inch and an half in length.—Nothing but the difficulty of procuring proper accommodations for conveying him to Georgia, prevented me from saving his life, and taking him on with me to introduce to you, when I returned north."

A cursory examination was made of the coastal sand-dunes between Delray and Palm Beach. Delray is situated about the southern extremity of the Palm Beach limestone. This limestone, however, has had little or no effect upon the vegetation, as it is mostly buried deep beneath the coastal sands.

The dune hammock here is interesting and often picturesque. The shrubs and trees are, for the most part, similar to the ones that once clothed the dunes near Miami, but here they grow thickly over vast areas, and they show a greater variety in the shades of green. The forest covering the part of the dunes sloping toward the ocean, however, is very stunted. For long distances the trees are only about as high as one's head. The crowns, moreover, are flattened on top by the continuous action of the wind from the ocean, and instead of reaching skyward, all the woody vegetation is pushed over, as if leaning away from the water or from the prevailing wind. Whole forests thus look as if a mighty hand had brushed across them and pressed them down.

On the leeward side of the dunes the arboreous vegetation is more normally developed. Where the dunes were tall, the trees were large and the forest extensive. There also the cabbage tree (*Sabal Palmetto*) was a prominent feature of the vegetation.

Although the Palm Beach limestone is normally buried beneath the sand of the dunes, there is an outcrop on the leeward side of a dune about midway between Delray and Palm Beach. Some of the deeply buried parts of the rock were long ago leached out and a portion of the upper part then caved in, thus forming some shallow caverns. A strangling-fig (*Ficus aurea*) growing on the face of one of these caves has sent down roots which now partly obstruct the mouth of the cavern. (See accompanying plate.)

In the open places there was a remarkable growth of the gopher-apple (*Geobalanus oblongifolius*) with the plants in full flower. This is one of the species—of which there are many in the south-eastern United States—that, as a matter of protection, have come to bury their main stems under the ground, and it is from these buried stems that they send up their branches erect. This condition most likely came about as a result of the fires that continuously sweep the country in which it grows. For, although it is a woody plant, its exposed wood is not resistant to fire. Thus, when fire-swept, all the branches are burned off, but new ones arise subsequently from the buried stem. The gopher-apple has no relative outside of the southern coastal plain. Another interesting case of a shrub with the main stem buried is found in northern peninsular Florida and northward. It is the chinquapin of the coastal plain, both that of the Atlantic and that of the Gulf. The widely distributed common chinquapin (*Castanea pumila*) grows mainly in the Piedmont and mountainous regions, where fires are comparatively rare, owing to a more fertile soil and a limited amount of tinder. Consequently, we find a larger plant—a tall tree or shrub. In the dry pinelands of the coastal plain, on the other hand, we find a poor soil and plenty of tinder. There, ordinarily, shrubs do not grow large and while still young they are very likely to be destroyed by a forest fire. Therefore, the chinquapin of the coastal plain is naturally a low shrub, but really not a small shrub, for it is greatly elongated. Upon investigation one will find that he can pull up a stout underground woody stem of the chinquapin several rods long. Beneath the sand this organ is perfectly safe from fire, and again as soon as fire has burned the erect branches, leaving mere blackened stubs, this buried stem sends up new branches to take their places.

Neither do the older geological formations, however, lack shrubs with subterranean stems. While writing this paper our attention was directed to an article bearing on this subject,¹ concerning the box huckleberry (*Gaylussacia brachycera*), chiefly as it occurs in the Blue Ridge of Pennsylvania. The particular

¹ Frederick V. Coville, *Science*, N. S. 50: 30-34. 1919.

plant in question and the only individual known to exist in a wild state, except another single plant in Delaware, is a shrub with underground stems occupying about eight acres and estimated to be over one thousand years old. A study of the shrubs with subterranean stems in the southern coastal plain and adjacent regions holds fascinating possibilities.

The most conspicuous herb of the open places in the hammock was a wild vervain (*Verbena maritima*) which was first collected at Cape Florida nearly a century ago. It was in full flower, and the numerous flower-clusters often eclipsed all other associated vegetation and sometimes formed extensive fields of blue. Although the conditions were apparently quite favorable, the more interesting and rare plants of the Miami dunes which lie only sixty-odd miles south of Palm Beach were not in evidence.

The last local excursion was made to the crest of the southern extremity of the water-shed of the Saint John's River. The term is here used technically, as no elevation is perceptible to the eye. This locality lies about one hundred and fifty miles north of Miami and a few miles inland. The region is uninhabited except for an apparently wholly out-of-place settlement called Felsmere, which in itself is rather embryonic. This watershed is indicated not only by the Saint John's, flowing northward on its long journey to the sea, but by the Onothohatchee and other small streams flowing southward into Lake Okeechobee; also by two local short rivers—the Sebastian flowing north for a dozen miles or so into the Atlantic and the Saint Lucie flowing south from near the source of the Sebastian, and also emptying into the Atlantic. However, the country is so flat that the water seems loath to flow at all.

Going westward from the vicinity of the settlement of Sebastian, after crossing the coastal range of stationary dunes, one comes out into the East Florida flatwoods, which geographical division, including various subdivisions, extends from Jacksonville southward. Beyond the Sebastian River streams are scarce or altogether wanting. There are both wet and dry pinelands, and the water apparently drains away north and south into lakes or lakelets which in turn give rise to streams which often connect and drain chains of lakes.

Several miles west of the Sebastian River we entered about as prolific a natural flower garden as I have seen in Florida, for here the pine-woods were a mass of flowering plants.

The low or wet places were carpeted with creeping plants of the figwort family (*Ilysanthes grandiflora* and *Hydrotrida caroliniana*); creeping evening primroses (*Ludwigia* and *Isnardia*), and white and blue violets, all interspersed with our smallest lobelia (*Lobelia Feayi*), but one with corollas equalling those of *Lobelia Kalmii* and related species in our northern regions.

In higher and drier places plants with yellow flowers often predominate. Thus there were three kinds of milkworts (*Polygala ramosa*, *P. lutea*, *P. cymosa*); Saint John's-worts (*Hypericum opacum*, *H. fasciculatum*); Saint Peter's-worts (*Ascyrum stans*, *A. tetrapetalum*); yellow asters (*Chrysopsis graminifolia*, *C. gigantea*); tickseed (*Coreopsis Leavenworthii*); beggar-ticks (*Bidens coronata*); heliotrope (*Heliotropium Leavenworthii*); sneezeweed (*Helenium tenuifolium*); helianthella (*Helianthella angustifolia*).

The sole, or at least the only conspicuous monocotyledon represented, aside from numerous grasses and sedges, was the pine-stars (*Oxyria albiflora*), a bulbous plant of the lily family which grew in clumps nearly everywhere.

Other white-flowered plants were: milkworts (*Polygala Baldwinii*), grass pinks (*Sabbatia Elliottii*), and beard-tongue (*Pentstemon multiflorus*).

Green also was prominent among the flowers, and it was especially represented by the milkweed family: green milkweed (*Acerates floridana*) and three related plants which are without "common" names, *Podostigma pedicellata*, *Ananthirax connivens*, *Asclepiadora viridis*.

Other and at the same time often brilliant colors were furnished by different kinds of meadow-beauties (*Rhexia cubensis*, *R. stricta*, *R. glabella*), bush clover (*Petalostemon carniun*), milkweed (*Asclepias lanceolata*), and the grass pink (*Sabbatia grandiflora*).

Altogether the land is not very much elevated, as is evidenced by the large number of moisture-loving plants that occur along with those typical of drier soil.

On our return trip we stopped to collect at the crossing of the Sebastian River. This stream has not figured in botanical records heretofore, and it thus seemed worthy of more investigation than we were able to devote to it. A tangled hammock lines the water's edge and extends back into the pinelands varying distances according to the character of the banks. We had little time to penetrate this jungle, but a short incursion brought to light the guava (*Psidium Guajava*), widely naturalized in this out of the way place, growing from seeds probably sown by birds.

The really interesting discovery, however, was a tree lead-plant (*Amorpha*), the first arboreous kind for the genus. The common shrubby lead-plant of the coastal region was just coming into flower, but this new one was past flowering, and bore only immature fruits. We hope to secure specimens in both flower and fruit later on.

Collecting along the Sebastian River incidentally brought to mind the condition of our knowledge, or rather lack of knowledge, of the floras of the numerous short and long rivers of Florida. The hammocks, prairies, swamps, and marshes of these various streams doubtless contain plants we know nothing about, and each river and its environs most likely harbor plants peculiar to themselves. Thus, each successive excursion into the wilds of the Peninsular State suggests fresh problems only to be solved by further field study and exploration.

Respectfully submitted,

JOHN K. SMALL.

NOTES, NEWS AND COMMENT

The Garden was visited August 27 by some four hundred members and guests of the American Pharmaceutical Association, then in convention in New York. The party, divided into groups, was guided through the Museum Building by members of the Garden staff, after which they visited the main conservatory range and drove through the grounds. The time was too brief for more than a cursory view of the collections, especially those

in the economic section, and many regrets were expressed that the fine materia medica collections could not be examined in detail, these being naturally of paramount interest to pharmacists.

Dr. and Mrs. N. L. Britton spent a two weeks' vacation in September at Mohonk Lake, New York.

Dr. J. N. Rose, of the Smithsonian Institution, spent two weeks at the Garden during September, studying the collections of cacti which he and Dr. Britton are monographing for the Carnegie Institution.

The exhibit of dahlias, held at the Garden September 20 and 21, was unusually successful. The Garden collection was in full bloom and, supplemented by the displays of outside dahlia growers, attracted a large number of visitors.

The glass-houses of Range 2, which had been vacated because of coal shortage over a year ago, have been partially reoccupied. The transverse house is now devoted to cycads and the larger ferns, while the three longitudinal houses are given to temperate zone woody plants, the smaller ferns, and orchids.

Dr. W. A. Murrill was invited to represent the New York Botanical Garden at a meeting of plant pathologists and Connecticut farm bureau agents, held during the week beginning August 18 at New Haven, Storrs, and elsewhere, for the discussion of some of the most important problems now confronting the Connecticut farmers, fruit growers, and truck gardeners. About twenty botanists, mostly from New England and New York, were present; while several hundred other persons were in attendance at special meetings. The evenings were devoted to brief papers and discussions; the mornings and afternoons to automobile tours through the plantations between New Haven, Hartford, and Storrs, covering a distance of three hundred miles.

The following visiting botanists have recently enrolled in the

library: Mr. Harry G. Wolfgang, Leetonia, Ohio, Rev. A. B. Hervey, Bath, Me., Mr. W. C. Fishlock, Tortola, B. W. I., Mrs. Adele Lewis Grant, Missouri Botanical Garden, Professor E. T. Bartholomew, Madison, Wis., and Dr. J. N. Rose, Washington, D. C.

After repeated efforts to find the plant in flower and not submerged by the tide, on September 10 of this season Dr. F. W. Pennell was successful in obtaining *Hemianthus micranthus* with its corollas expanded. This diminutive member of the figwort family grows in the gravelly tidal flats of the Delaware River above Camden, New Jersey, and its remarkable flower-structure has not been described from fresh corollas since the days of its first discovery by Thomas Nuttall over one hundred years ago. *Hemianthus micranthus* is the only northern member of a considerable West Indian genus, the various species of which show interesting steps in an evolution from a flower similar to that of most of this family to such as our own, a species which truly deserves the name of *Hemianthus*, "half flower."

Meteorology for August.—The total precipitation for the month at the New York Botanical Garden was 4.13 inches. The maximum temperatures for each week were 92° on the 8th, 84½° on the 11th, 95° on the 24th, and 84° on the 29th. The minimum temperatures were 55° on the 3d, 52° on the 9th, 60° on the 19th, and 53° on the 28th.

ACCESSIONS

MUSEUMS AND HERBARIUM

500 specimens of European flowering plants. (By exchange with Oxford University.)

100 specimens of flowering plants from the United States and Canada. (Collected by John Macoun.)

1,000 specimens of flowering plants from Mexico. (Collected by Brother Arsène.)

3 specimens of mosses from Venezuela. (By exchange with the United States National Museum.)

1 specimen of *Selaginella apus* from New York. (Given by Dr. W. A. Murrill.)

12 specimens of fossil marine algae from France. (By exchange with Mr. Lucien Morellet.)

9 specimens of different species of *Ochroma*. (Given by Professor W. W. Rowlee.)

1 specimen of *Trillium undulatum* from North Carolina. (Given by Mr. A. M. Huger.)

16 specimens of marine algae from the Antarctic. (By exchange with Dr. Carl Skottsburg.)

127 specimens of flowering plants from California. (By exchange with the Field Museum of Natural History.)

180 specimens of flowering plants from California. (Collected by Miss Roxana S. Ferris.)

1 specimen of *Corticium vagum* from Alabama. (By exchange with Mr. George L. Peltier.)

28 specimens of fungi from Maryland. (By exchange with Mr. C. A. Schwarze.)

1 specimen of *Cordyceps* from Pennsylvania. (By exchange with Dr. L. O. Overholts.)

1 specimen of *Cenangium Abietis* from New Mexico. (By exchange with Mr. W. H. Long.)

3 specimens of fungi from Ontario. (By exchange with Prof. John Dearnness.)

1 specimen of *Craterellus cornucopioides* from Maryland. (By exchange with Mr. C. A. Schwarze.)

5 specimens of fungi from Ontario. (By exchange with Professor John Dearnness.)

1 specimen of *Lepiota cretacea* from Washington, D. C. (Collected by Dr. J. N. Rose.)

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The New York Botanical Garden

JOURNAL

OF

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EDITOR

H. A. GLEASON*First Assistant*

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SOME BLUEBERRIES OF MARLBORO, N. H.

Southern New Hampshire is noted for the great abundance and variety of its blueberries, so that I was glad of an opportunity, during the middle of July of the present year, to make collections there for the Economic Museum of the Garden. In doing so, I found the varieties and forms so numerous, and their relations so interesting, as to be worthy of published record.

Most of my studies and collections were made on the estate of Mrs. B. C. Knight, of Marlboro, and the adjoining one of Mr. Baker. The plants grew in rocky pasture land, mostly rather dry, but with some damp spots. Practically all of the forms described grew on the dry lands.

I found no specimen of *Gaylussacia*, nor any of the section *Euvaccinium*, nor was I able to learn that any of either group occurs in the region. My observations were confined therefore to the *corymbosum* and *pennsylvanicum* groups of the section *Cyanococcus*. All the forms here described are represented by specimens in the Garden Herbarium, designated by the numbers here employed preceded by the word "Marlboro." Most of these are also preserved in formaldehyde in the economic museum but do not there bear these numbers.

Had all definite, or even all striking forms been collected, the number would have been considerably larger, for there are conspicuous differences in habit of growth, as well as in herbarium characters, which cannot be overlooked and which are constant in numerous individuals. So numerous are the forms and so

gradual the series of variations, that it seems as though names can be regarded merely as conveniences for indicating certain of these grades. While questions of hybridity can be settled only experimentally, there seems to me to be no other way of accounting for conditions in this group than by assuming free hybridization.

The species represented in the collection are *Vaccinium corymbosum*, *atrococcum*, *angustifolium* (*pennsylvanicum*), *canadense*, and *vacillans*. The last two are not common and did not present any particular diversity, although it is not impossible that cross pollination of *corymbosum* and *canadense* is responsible for some of the variations observed. *Vaccinium nigrum* Britton may be a distinct species from the var. *nigrum* here discussed, which latter appears to me to be a variety of *V. pennsylvanicum*.

It is worthy of note that all the forms discussed grow together indiscriminately. There is no particular habitat that is especially favorable to any of them. All grow taller in shaded locations or when massed or amidst other shrubbery, and more low and spreading when in open sunny positions. I have been surprised to find a plant a foot taller than myself that certainly appears to belong to *V. pennsylvanicum*, unless it be a hybrid of that with *V. corymbosum*, which is not at all improbable.

V. CORYMBOSUM L. The typical plant is tall, forming large clumps, with spreading branches and leaves, the latter more or less broad, the margin entire, the entire plant glabrous, the berry large and blue. Although the species, in other forms, is the predominant one of the locality, this typical form was not found. The nearest approach to it was an occasional plant differing only in slight hairiness on the veins of the lower leaf surface.

Number 1 of my collection represents the form just mentioned, except that the leaf margin is sharply serrate with bristle-pointed teeth. The leaves are quite pale beneath, but are not glaucous.

Number 2 differs from Number 1 in having the lower leaf surface very pubescent and the twigs slightly so. The hairs are

rather long, straight and stout, and strongly spreading. The upper surface of the leaf is glabrous but not shining. The berries are either bright-blue or nearly black, but never in the least shiny.

Number 3 differs from the two preceding in having the leaf margin entire or obscurely denticulate, and ciliate with fine soft hairs. The lower surface is only slightly pubescent on the veins. This is rather scarce and is perhaps the nearest approach to the typical form.

Numbers 4 and 5 represent the var. *amoenum* of Gray's Manual, the leaves being of a bright-green color on both surfaces. Number 5 has both surfaces glabrous and the margins sharply serrate with bristle-pointed teeth. In number 4, there is a slight pubescence on the lower surface and the margin is practically entire. This variety *amoenum* is probably the predominant high bush blueberry of the region, although the plants are often only two or three feet high and widely spreading. Its berries are very large and fine, of a bright-blue color, and it is the favorite form of fruit-gatherers.

Number 6 agrees with the scanty description of var. *pallidum* found in Gray's Manual. It is a very distinct form and is quite abundant. The shrub is very tall and rather strict and contracted. The branchlets and leaves incline to an erect position, the latter being thick, rigid, elongated, and large, tapering to both ends, the margin quite entire, both surfaces smooth and the lower glaucous. The berries incline to an elongated form, with large calyx lobes, and are very glaucous. Quite often they are smaller and dryer than in the other high bush forms.

Number 7 differs from Number 6 in having a few stiff hairs on the veins beneath and the margin bristly serrate. The lower surface is quite glaucous, although this does not show very well in the dried specimen.

V. *ATROCOCCUM* (Gray) Heller. This, although very variable, is a well-marked species. It seems to me to hybridize with others but even in the hybrids its own character is always strongly apparent. The shrub may be quite as tall as any form of V.

corymbosum, but is always more spreading, as are also its leaves. The fruit clusters are shorter and more open than in *V. corymbosum*. Its berries are large, black and almost always shining, and luscious. The occasional dull-berried forms may be hybrids. The hairs are not straight as in all the others of the region, but are inclined to be fine, soft, and more or less curly or at least crooked. This pubescence is well denominated as "down."

Number 8 has the leaves hairy beneath, the margins entire, but softly hairy. Number 8 A has the leaves markedly pale beneath and appearing as though glaucous, although somewhat hairy, with the margins entire and softly hairy. The berry is dull-black. Number 8 B is low and slender. The leaves are small, narrow and thin, as in var. *nigrum*, hairy on the midrib beneath, with the margin entire. The branches of the inflorescence, calyx, etc., are bright-red. Number 8 C is similar, but very tall. Its twigs, petioles, and lower leaf surface are very hairy, and its leaves are markedly shiny on the upper surface.

Number 9 is *V. atrococcum*, but with the leaves hairy on both surfaces and the margin entire. Number 10 is *V. atrococcum*, but with the leaf margin bristly-serrate. Number 11 is similar, but with the leaves very hairy beneath, shining above, and with bristly-serrate margin.

V. ANGUSTIFOLIUM Ait. (*V. pennsylvanicum* Lam.). Both the typical plant and its numerous varieties are very common and abundant. The type has its twigs green and finely warty but glabrous, the leaves thickish and firm, lanceolate to oblong, acute at the summit and less so at the base, smooth and shining on both surfaces, the margin sharply serrate with bristle-pointed teeth, the berry large, blue, and sweet. The shrub is usually low and spreading, but presents many distinct forms as to habit. Of each of the forms described below there is a black-berried variety.

Number 12 is the typical plant just described. Number 13 differs in having the young twigs, petioles, and lower leaf surfaces hairy, the hairs being straight and spreading. Number 14 differs from the latter only in having the leaf margin entire. This may be a form of or a hybrid with *V. canadense*.

Number 15 has the twigs, petioles, and lower leaf surfaces copiously hairy, the leaves broad, pale, and thin, with the margin as in the type.

Number 16 is *V. pennsylvanicum angustifolium* of Gray's Manual. It is a strikingly distinct form and fully deserves a name, but if the species is to be called *angustifolium*, the varietal name must of course be different. This plant is conspicuous by the very erect habit of its branches and leaves, the extremely tough nature of its stems, and its narrow leaves of a very deep green, with the midrib hairy on the lower surface. It strongly suggests specific rank.

Number 17 has the leaves broader than those of number 16, but narrower than in regular *V. pennsylvanicum*, with the margin merely denticulate. It preserves the same habit.

V. ANGUSTIFOLIUM NIGRUM Wood. The question of the existence of *V. nigrum* as a distinct species, as claimed by Britton, is not here raised, but I am not in doubt as to the black-berried forms described below being mere varieties of *V. angustifolium*. Every form of this species as described above, with the exception of number 16, occurs with both blue and black berries. These may be either dull or shiny, but are never so markedly shiny as in *V. atrococcum*.

Number 18 is the typical form described as number 12, except for the black berries. Its twigs are green and warty as in the type. Number 19 differs from the preceding only in having the midribs hairy on the lower surface, while number 20 has neither leaf surface shiny and the lower surface is hairy.

There are two other forms of var. *nigrum* of which I appear to have missed collecting specimens. One is similar to Number 20, except that the leaf margin is entire and softly hairy. It is noted that this approaches very closely to *V. canadense*, differing only in having the upper leaf surface dull and glabrous instead of dull and hairy, and in having black berries. There seems to be no good evidence in the fruiting specimen to show that it should not be regarded as a black-berried form of *V. canadense*. The other is a form that appears intermediate between var. *nigrum* and *V. atrococcum*. It is much taller than *V. pennsyl-*

vanicum, but has its habit rather than that of *V. atrococcum*. The berries are shiny and the branches of the inflorescence red, as sometimes occurs in that species, and what pubescence there is, is more like that of the latter.

H. H. RUSBY.

THE HISTORY OF THE LONDON PLANE

For many years the London plane, *Platanus acerifolia*, has been a favorite shade tree for city streets in the eastern United States, because of its extraordinary ability to flourish under conditions of drought and smoke which prove fatal to other species. In New York City at present, a majority of the trees in the more congested districts are of this form. It is, however, usually planted under the name of Oriental plane, *Platanus orientalis*, and has been mistaken for that species not only by nurserymen but by some botanists as well.

A recent article in the *Proceedings of the Royal Irish Academy*, entitled "The history of the London Plane," by A. Henry and Margaret G. Flood, throws much light on the nature and origin of this interesting tree, and indicates that it is a hybrid of the Oriental plane and the native buttonwood or sycamore, *Platanus occidentalis*. Since this article will be easily overlooked by American planters and since the tree is of so much importance in American gardening, it seems advisable to give some extracts from the original article.—ED.

"The London Plane, *Platanus acerifolia* W., has all the peculiarities which are met with in a first cross. It is intermediate in fruit and leaves between the supposed parents—the Oriental Plane, which is indigenous in Greece and Asia Minor, and the Occidental Plane, which grows in a wild state in the forests of the eastern half of the United States. Its vigor is exceptionally great, as is usual in hybrids of the first generation; and its seeds when sown produce a mixed and varied crop of seedlings, in which are variously combined the characters of the two parents. Several supposed forms of the London Plane which are not un-

commonly cultivated, appear to be chance seedlings of this tree, being hybrids of the second generation.

"The vigor of the London Plane is remarkable. It is extensively used for planting in the streets of towns in Europe and North America, as it has been found to surpass all other trees in its powers of resistance to drought, smoke, and other unfavorable conditions of soil and atmosphere. In the cities of New England, Ohio, Pennsylvania, etc., the London Plane is much more successful as a street tree than the Western Plane, notwithstanding the fact that the latter is the finest and largest native broad-leaved tree in the forests of these states. The selection as a street tree of the London Plane in preference to the native species in the regions where the latter flourishes, depends on the vigor inherent in the former tree on account of its hybrid origin.

"The London Plane, being undoubtedly a hybrid, must have originated as a chance seedling in some botanic garden, where an Occidental Plane and an Oriental Plane happened to be growing close together. Such a seedling, by the vigor of its growth and the novelty of its foliage, would attract attention and be propagated by an observant gardener. The ease with which the London Plane can be raised from cuttings would much facilitate its propagation. I shall try to show that it possibly originated in the Oxford Botanic Garden about 1670, though this surmise cannot be definitely proved.

"The Occidental Plane was introduced from America into England by Tradescant in 1636, about a century later than the earliest record of the Oriental Plane in this country. By 1670, there would have been trees of the American species old enough to bear pollen. The connexion with Oxford is as follows: Jacob Bobart, junior, who succeeded his father as curator of the Botanic Garden at Oxford in 1680, left in MS. an 'Enumeration of Trees and Shrubs,'* in which for the first time there is mention in any record of the London Plane. This MS. is unfortunately without date; but a similar MS. has 1666 on the flyleaf. In the 'Enumeration' the planes in cultivation are distinguished as follows:

* "This is printed by Vines and Druce, 'Account of Morrisonian Herbarium,' p. 261 (1914)."

"No. 475. *Platanus orientalis*, pilulis amplioribus.

"No. 476. *P. inter orientalem et occidentalem media*.

"No. 477. *P. occidentalis aut virginensis*.

"Corresponding to the diagnosis, No. 476, of the London Plane, as intermediate between the Oriental and the Occidental species, there is a dried specimen, undoubtedly *P. acerifolia*, in the Sherard Herbarium at Oxford, labelled '*Platanus media*.'

"The first published description of the London Plane was by Plukenet in 1700, in his 'Mantissa,' p. 153, which reads as follows: '*Platanus orientalis et occidentalis mediam faciem obtinens, Americanus, globulis grandioribus, foliis splendentibus atris*.' The type specimen of this description is in the British Museum, Herb. Sloane, No. 101, folio 112. In addition there are two sheets of specimens, collected by Petiver about the same period, one of which, Herb. Sloane, No. 149, folio 237—two fine leaves of *Platanus acerifolia*—is labelled '*Platanus media*, n. d. Bobart, Ox.'

"It is possible that the original tree, from which this specimen was taken by Bobart, was then living in the Oxford Botanic Garden. As Plukenet describes this plane as bearing large fruit-balls in 1700, it may have been then thirty years old, which would give the date or origin of *Platanus acerifolia* as 1670.

"This history synchronizes well with the date of the magnificent London Plane,* probably the oldest in Europe, which is living in the Palace Garden at Ely and now measures 110 feet high, the trunk being 23 feet in girth at 5 feet above the ground. It was planted by Gunning, when he was bishop there between 1674 and 1684. Bishop Gunning spent some time at Oxford before his appointment to the Ely diocese.

"The splendid London Plane at the Ranelagh Club, Barnes, is precisely of the same size as the Ely tree, and is probably of the same age, both these trees being apparently cuttings of the original tree, which is postulated in this account to have been in the Oxford Botanic Garden. There is no record of the age of the Ranelagh Club tree. There are two other immense London

* "Owing to an unfortunate mistake, the Ely tree is erroneously identified with *P. orientalis* in Elwes and Henry, 'Trees of Great Britain,' iii, 621, plate 174 (1908)."

Planes, probably coeval with the Ely tree, namely, one at Peamore, near Exeter, and the other at Woolbeding, Sussex, but no particulars of their history can be obtained.

"On the Continent there are no examples of the London Plane approaching in size or age the fine trees at Ely and Barnes; and no mention is made of it by any Continental writer before 1703, when it was briefly described by Tournefort. Since the latter date, the cultivation of the London Plane has spread over the Continent, and it is now common in towns in France and Germany. In the United States, as stated above, it is widely cultivated as a street tree, but almost invariably under the erroneous name of '*P. orientalis*.' The true *P. orientalis* is very rare in America, and is never used for planting in streets.

"When the seed of a first cross is sown the seedlings produced constitute a mixed and varied crop, in which are variously combined the characters of the two parents. The best proof then of the hybrid nature of *P. acerifolia* is the fact that it does not come true from seed, which appears to have been known to Lorberg in 1875. Two sowings made in recent years establish this very clearly. There are now eight seedlings planted in the Queen's Cottage grounds at Kew which were raised from seed of *P. acerifolia* that was sown in April, 1911. These range in height from 4 to 10 feet, and are very diverse in foliage, some closely resembling *P. orientalis* and others resembling *P. occidentalis*, a few being intermediate. One of them appears to be identical with *P. hispanica*, and another with *P. cuneata*. There are also two seedlings at Glasnevin which are the only survivors of a set raised for me at Cambridge in 1910 from seed of a large London Plane growing near the main gate at Kew. The rest of the set died from drought, having been transplanted into a field in that dry year. These two seedlings are extremely unlike in foliage; one has leaves indistinctly lobed resembling those of *P. occidentalis*. The other has deeply lobed leaves, and differs little from *P. cuneata*.

"Several unsuccessful attempts have been made since 1910 to raise a numerous set of seedlings of the London Plane with the object of studying the botanical characters of the various

classes which are wont to occur in the second hybrid generation. Space for such experiments is scarcely available, as planes do not assume for several years their adult foliage, and do not produce fruit till they are twenty or thirty years old.

"The artificial production of a cross between *P. orientalis* and *P. occidentalis* has not been possible in this country, where there exists no adult living tree of the latter species from which pollen could be obtained. An attempt to reproduce *P. acerifolia* by cross-pollination of the Occidental and Oriental Planes might be made in the United States, using the native tree as the female parent."

THE SCIENTIFIC SURVEY OF PORTO RICO AND THE VIRGIN ISLANDS

In 1913, the New York Academy of Sciences in coöperation with the insular government of Porto Rico, The American Museum of Natural History, The New York Botanical Garden, and with scientific departments of Columbia University and other institutions, commenced an investigation of the geology and natural history of Porto Rico, which was subsequently extended to include the Virgin Islands. Field, museum and laboratory work have since been prosecuted by a large number of investigators and students of the several institutions, and although much interrupted and retarded by war conditions, the study is well advanced, and some 36 preliminary papers have been published in various journals and bulletins of institutions and in the proceedings of learned societies. The collections of the institutions have been enriched by many thousand specimens obtained during the field operations.

The first part of the first volume of the final reports of this Survey was published on September 26th, 1919, and may be purchased from the Secretary of the Academy. It is an octavo book of 110 pages, with 26 text-figures, 4 plates and 3 maps, and contains (1) A History of the Survey, with references to the already published preliminary papers, by Dr. N. L. Britton; (2) Geological Introduction, including a discussion of the major

geologic features and a bibliography by Professor C. P. Berkey, to which is appended a description of a new base map of Porto Rico by Dr. Chester A. Reeds; (3) Geology of the San Juan District, an area of about 500 square miles on the northern side of Porto Rico, by Dr. Douglas R. Semmes.

The final reports on the botany of the Survey will take the form of a descriptive and annotated flora, based largely on specimens in the herbarium and museum of the New York Botanical Garden obtained during several collecting expeditions by members of the staff and special agents from 1901 to 1916. Much manuscript for these reports has been prepared, and it is planned to publish the first botanical part in 1920.

The publication of these survey reports will go far toward making Porto Rico the key to the geology and natural history of the West Indies.

N. L. BRITTON.

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Oxydendrum. SOURWOOD

Oxydendrum arboreum. SOURWOOD.

Location: Fruticetum. East bank of West Lake.

Natural distribution: Southeastern United States.

Epigaea. TRAILING ARBUTUS

Epigaea repens. TRAILING ARBUTUS.

Location: Wild, very scarce, though formerly more common; exterminated by the public.

Natural distribution: Eastern North America.

Gaultheria. GAULTHERIA

Gaultheria procumbens. CREEPING WINTERGREEN.

Location: Wild, scarce.

Natural distribution: Eastern North America.

Calluna. HEATHER**Calluna vulgaris.** HEATHER.

Location: Fruticetum.

Natural distribution: Europe.

VACCINIACEAE. Huckleberry Family

Gaylussacia. HUCKLEBERRY**Gaylussacia baccata.** BLACK HUCKLEBERRY.

Location: Fruticetum.

Natural distribution: Eastern North America.

Polycodium. DEERBERRY**Polycodium stamineum.** DEERBERRY.

Location: Fruticetum.

Natural distribution: Eastern United States.

Vaccinium. BLUEBERRY**Vaccinium angustifolium.** LOW-BUSH BLUEBERRY.

Location: Fruticetum.

Natural distribution: Northeastern North America.

Vaccinium atrococcum. BLACK BLUEBERRY.

Location: Wild.

Natural distribution: Eastern United States.

Vaccinium corymbosum. HIGH-BUSH BLUEBERRY.

Location: Wild.

Natural distribution: Eastern North America.

Vaccinium pallidum. PALE BLUEBERRY.

Location: Fruticetum.

Natural distribution: Virginia to South Carolina.

Vaccinium vacillans. BLUE HUCKLEBERRY.

Location: Fruticetum.

Natural distribution: Eastern United States.

EBENACEAE. Ebony Family

Diospyros. PERSIMMON**Diospyros virginiana.** PERSIMMON.

Location: Arboretum. Along road east of Museum. At fountain southeast of Museum.

Natural distribution: Southeastern United States.

SYMPLOCACEAE. Sweet-leaf Family

Symplocos. SYMPLOCOS**Symplocos paniculata.** ASIATIC SYMPLOCOS.

Location: Arboretum.

Natural distribution: Himalayan Region to China and Japan.

STYRACACEAE. Storax Family

Halesia. HALESIA**Halesia carolina.** SNOWDROP-TREE.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Styrax. STORAX**Styrax americana.** SMOOTH STORAX.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Styrax japonica. JAPANESE STORAX.

Location: Fruticetum.

Natural distribution: Japan.

Styrax Obassia. OBASSIA STORAX.

Location: Fruticetum.

Natural distribution: Japan.

Pterostyrax. WINGED STORAX**Pterostyrax hispida.** HISPID WINGED STORAX.

Location: Fruticetum. Near approach to elevated railroad.

Natural distribution: Japan.

OLEACEAE. Olive Family

Fontanesia. FONTANESIA**Fontanesia Fortunei.** ENTIRE FONTANESIA.

Location: Fruticetum.

Natural distribution: Eastern China.

Fontanesia phylleraeoides. TOOTHED FONTANESIA.

Location: Fruticetum.

Natural distribution: Sicily, Asia Minor, Syria and Palestine.

Fraxinus. ASH**Fraxinus americana.** WHITE ASH.

Location: Arboretum. Both sides of road at Lake Bridge.
Wild, common.

Natural distribution: Eastern North America.

Fraxinus americana var. **cucullata.** HOOD-LEAVED WHITE ASH.

Location: Arboretum.

Fraxinus biltmoreana. BILTMORE ASH.

Location: Arboretum. Near Power House 1.

Natural distribution: Southeastern United States.

Fraxinus Bungeana. BUNGE'S ASH.

Location: Arboretum.

Natural distribution: China.

Fraxinus campestris. PRAIRIE ASH.

Location: Arboretum. Near Power House 1.

Natural distribution: North Central United States.

Fraxinus excelsior. EUROPEAN ASH.

Location: Arboretum.

Natural distribution: Europe and western Asia.

Fraxinus excelsior var. **aurea.** GOLDEN EUROPEAN ASH.

Location: Arboretum.

Fraxinus mandschurica. MANCHURIAN ASH.

Location: Arboretum. Near Power House 1.

Natural distribution: Manchuria, Chosen and Japan.

Fraxinus Michauxii. MICHAUX'S ASH.

Location: Arboretum. Wild, north meadow.

Natural distribution: Eastern United States.

Fraxinus nigra. BLACK ASH.

Location: Arboretum.

Natural distribution: Eastern North America.

Fraxinus Ornus. EUROPEAN MANNA ASH.

Location: Arboretum.

Natural distribution: Southern Europe and western Asia.

Fraxinus pennsylvanica. RED ASH.

Location: Arboretum. Wild.

Natural distribution: Eastern North America.

Fraxinus pennsylvanica var. **lanceolata**. GREEN ASH.

Location: Arboretum.

Fraxinus profunda. PUMPKIN ASH.

Location: Arboretum.

Natural distribution: South Central United States.

Fraxinus quadrangulata. BLUE ASH.

Location: Arboretum. Near fountain at foot of Museum approach.

Natural distribution: Eastern United States.

Fraxinus rotundifolia. ROUND-LEAVED ASH.

Location: Fruticetum.

Natural distribution: Southern Europe and western Asia.

Fraxinus texana. TEXAN ASH.

Location: Along road from Museum to South Gate.

Natural distribution: Texas.

NOTES, NEWS AND COMMENT.

There has recently been installed in the economic museum at the Garden an educational exhibit of ivory-pyralin, presented by the E. I. DuPont de Nemours Company of Wilmington, Delaware. Pyralin is the trade name of a substance very similar to celluloid and is purely a plant product. The basic substance in its manufacture is cotton, the cellulose of which is dissolved in acid, mixed with camphor, which is also a plant product, and made into a dough-like substance which can be molded into almost any form. Pyralin is used in the manufacture of combs, brushes, mirror backs, and other household utensils too numerous to mention. The white form is a close imitation of ivory, and with the use of proper pigments a form is made to represent tortoise shell. Transparencies are also made, such as those used in the curtains of automobiles.

Dr. Florence A. McCormick, of the Connecticut Agricultural Experiment Station, recently spent a day in the library studying the literature of the white pine blister rust.

Dr. Marshall A. Howe lectured September 24 on "Dahlias and Their Culture" before the North Country Garden Club at the home of Mr. W. J. Matheson, Huntington, Long Island. Mr. Matheson, who is a member of the Board of Managers of the Garden, has a choice collection of dahlias and has been a frequent prize-winner at exhibitions in New York City and vicinity. He has also been a generous donor of roots to the dahlia border at the Garden, contributing 94 varieties when the border was started in the spring of 1918.

A maple tree, furnished by the Garden, was planted at New York University, University Heights, The Bronx, on the occasion of the conferment of an honorary degree of Doctor of Letters upon Cardinal Mercier on the afternoon of October 8, 1919.

Dr. A. B. Stout, Director of the Laboratories, recently spent some time at Geneva, N. Y., where he inspected the collection of grapes on the grounds of the experiment station in connection with his studies on sterility in plants.

Dr. A. S. Hitchcock, of the Division of Agrostology at Washington, sailed October 4 for a six-months collecting trip in British Guiana. On this expedition he will pay chief attention to the grasses, a group in which he has specialized for years. His work is a portion of the tripartite exploration of northern South America, undertaken by the National Herbarium, the Gray Herbarium, and the New York Botanical Garden, and a set of his collections will be deposited in the Garden herbarium.

Owing to the increased cost of publication, the subscription price of *Mycologia* has been advanced to four dollars per year, taking effect at the beginning of 1920. The same price will also apply in the purchase of back volumes, which can still be supplied in complete sets.

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EDITOR

H. A. GLEASON

First Assistant

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DR. FRANCIS W. PENNELL, *Associate Curator*
GEORGE V. NASH, *Head Gardener*
DR. A. B. STOUT, *Director of the Laboratories*
DR. JOHN HENDLEY BARNHART, *Bibliographer*
SARAH H. HARLOW, *Librarian*
DR. H. H. RUSBY, *Honorary Curator of the Economic Collections*
ELIZABETH G. BRITTON, *Honorary Curator of Mosses*
DR. ARTHUR HOLLICK, *Honorary Curator of Fossil Plants*
DR. WILLIAM J. GIES, *Consulting Chemist*
COL. F. A. SCHILLING, *Museum Custodian*
JOHN R. BRINLEY, *Landscape Engineer*
WALTER S. GROESBECK, *Clerk and Accountant*
ARTHUR J. CORBETT, *Superintendent of Buildings and Grounds*
KENNETH R. BOYNTON, *Supervisor of Gardening Instruction*



Central Display House (right) at Conservatory Range 2

JOURNAL

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THE NEW GREENHOUSES PRESENTED BY MESSRS. DANIEL GUGGENHEIM AND MURRY GUGGENHEIM

[WITH PLATES 239 AND 240]

On April 19, 1917, in a report of the Endowment Committee to the Board of Managers upon the further development of the Garden,* record was made of the generous gifts by Messrs. Daniel Guggenheim and Murry Guggenheim of \$50,000 each for the construction of the Central Display Greenhouse and an Orchid Greenhouse at Public Conservatory Range 2, on the eastern side of the grounds north of the Allerton Avenue entrance. The recent completion of these elegant and useful structures may now be recorded.

Soon after the gifts of money were made, working drawings and specifications were prepared by Mr. John R. Brinley, landscape engineer, and his assistant, Louis F. Bird, and the plans having meanwhile been approved by the Municipal Art Commission, bids for the structural work were submitted to contractors for proposals; all excavation, filling and grading, as well as driveway and path approaches, interior paths, tanks and brooks, benches, and the building of a large additional coal-bunker at the power house have been accomplished by mechanics and laborers working under the direction of Arthur J. Corbett, superintendent of buildings and grounds, and John Finley, foreman gardener.

For the contract work, bids from the following firms were accepted:

* Journal 18: 121-125.

1. Masonry, concrete, drainage and water-supply: Joseph Havender, Woodlawn, New York.

The contractor was required to use building stone of high quality obtained in the course of grading operations, including the removal of a large ledge of rock which stood between the building site and the Bronx Boulevard, within two hundred feet of the work. The excavations also supplied a large quantity of high-quality building sand.

2. Heating, including installation of an additional 150 horsepower steam boiler in the power house: The Johnston Heating Company, New York.
3. Superstructures: The King Construction Company, North Tonawanda, New York.

The three contracting firms worked well together; there were occasional delays in adjusting the progress of masonry and concrete to other elements of the work, but these were overcome by persuasion. More extensive delays were encountered in the delivery of building material for the superstructure caused by war conditions, and the contract time had to be repeatedly extended. The contracts were all finally completed and the work accepted in July, 1919, leaving interior grading, benching and planting to be done.

During the Spring Inspection of Grounds, Building and Collections on May, 1919, members of the Garden and guests visited the new greenhouses, and bronze tablets, commemorating the gifts of the Messrs. Guggenheim were unveiled.*

During the autumn months of 1919, nearly all interior work contemplated was accomplished and plants were moved into the Central Display Greenhouse during the latter part of October and the first part of November and arranged under the direction of George V. Nash, head gardener and H. W. Becker, foreman gardener. This structure was opened to the public on the afternoon of November 8, with appropriate ceremonies, including addresses by Dr. W. Gilman Thompson, president of the Garden, by Dr. D. T. MacDougal, director of botanical research, Carnegie Institution of Washington, and by Dr. N. L. Britton,

* Journal 20: 114-115.



Interior view of the Central Display House. Conservatory Range 2

director-in-chief of the Garden. A large and beautiful display of plants and flowers was installed in coöperation with the Horticultural Society of New York, and suitable prizes awarded from the income of the William R. Sands Fund.

A noteworthy feature of the Central Display Greenhouse is provision within it of space for lectures, meetings and special displays, facilities for which have long been needed. At the suggestion of President Thompson, the plans were drawn so as to provide a central space with a reinforced concrete floor over a commodious cellar, upon which audiences of about 200 persons may be comfortably seated. This was at once taken advantage of and public lectures were delivered as follows:

November 15. Cycads and Sago Palms, by Dr. N. L. Britton.

November 22. Tropical Orchids, by Mr. George V. Nash.

November 29. Tropical Ferns and Their Relatives, by Dr. H. A. Gleason.

Other series of lectures will follow. The arrangements proved wholly satisfactory and the surroundings, formed of palms, are unique and beautiful.

The permanent planting of the two ends of the Central Display House will be chosen from plants of warm-temperate and subtropical regions. The collections primarily installed have been taken from House 13 of Public Conservatory Range 1, where the plants have been greatly crowded for several years; this House 13 will now be largely occupied by palms drawn from House 1, also overcrowded.

The greenhouse for orchids, much smaller than the Central Display House, will provide abundant space for the orchid collection as now constituted, as well as for its increase; it is desirable that this collection be increased whenever funds for the purchase of orchid plants become available. It is proposed to install the collection, now in other greenhouses, during the winter or spring.

THE ELM LEAF BEETLE

The statement was made in 1905 that this imported insect was in all probability responsible for more ruined elm trees in the Hudson River valley than all other destructive agencies combined. Certainly the same statement could be applied with equal truth to the Connecticut River valley and doubtless to many other localities where the insect has been established.

It is thought that the beetle was introduced into this country about 1834, and since that time many thousands of elms have been killed by its repeated attacks. While individual insects do not fly far, the spread of the species has been comparatively rapid, and its history and destructiveness is too well known to deserve extensive discussion.

A few seasons ago attention was attracted to the sudden subsidence of the beetle at the New York Botanical Garden. So rare had it become that it was difficult to locate a single individual. This sudden disappearance was quite naturally attributed to local activity in the application of sprays. Inquiry soon disclosed the fact that similar conditions had been noted in Massachusetts, New Jersey, and other parts of New York and by the writer's personal observations in the Connecticut River valley. Each locality attributed the sudden decrease or complete disappearance of the insect to its own efforts in the use of control measures. In the Connecticut valley, however, the beetle disappeared from large trees which had been badly infested and had never been sprayed, so that its disappearance could not have been due entirely to artificial control but probably to some unfavorable natural condition or the sudden appearance of some natural enemy.

While spending a vacation at Portland, Connecticut, in the summer of 1919, the writer noticed that the elm leaf beetle, which had been conspicuous by its absence during the four preceding years, had reappeared in such numbers that by the end of July the leaves of many trees had been completely skeletonized and were beginning to turn brown.

Later in the season the trees in the New York Botanical Garden

were inspected and found to be still free from the insect as far as could be determined from a superficial examination from the ground. From these observations the conclusion may be drawn that the elm leaf beetle is reappearing, but only in localized areas. A careful inspection of elm trees should be made and spraying resumed wherever necessary with the hope of being able to assist nature in keeping the insect from attaining its former destructiveness.

F. J. SEAVER

THE LOTUS OF ANCIENT EGYPT

There were two species of "lotus" known to the ancient Egyptians, one with white and the other with blue flowers. Both were true water-lilies, with heart-shaped leaves that rested on the surface of the water; and both were held sacred as symbolic of the creation.

The plant known in America as the "Egyptian lotus" is not a true water-lily, but a *Nelumbo*, having tall circular leaves, pink flowers, and peculiar pitted fruits containing small nuts. It was held sacred in India, China, and Japan.

I have looked through all the collections at the Metropolitan Museum of Art and have not found this latter plant, the oriental lotus, used as a decorative motive by the ancient Egyptians. What I have found is mostly the blue lotus, *Castalia coerulea*, and rarely the white lotus, *Castalia Lotus*.

The true Egyptian lotus was one of the oldest, as well as one of the most beautiful, plant motives ever used. It grew abundantly in the valley of the Nile and was employed by the Egyptians, together with the papyrus and palm, in many forms of decorative art.

Neither the true lotus of ancient Egypt nor the sacred lotus of the Orient must be confused with the plant referred to in Tennyson's poem, which was the jujube, a prickly shrub bearing fruits resembling a plum or date and much used as a dessert. Homer describes the wandering Ulysses as arriving at the coast of Libya, where many of his sailors partook of the jujube fruits and immediately lost their desire to return to home and friends.

W. A. MURRILL

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Forsythia. GOLDEN-BELL

Forsythia europaea. EUROPEAN GOLDEN-BELL.

Location: Fruticetum.

Natural distribution: Albania.

Forsythia Fortunei. FORTUNE'S GOLDEN-BELL.

Location: Fruticetum. Near plaza, Harlem Railroad depot.

Natural distribution: China.

Forsythia Fortunei var. **atrocaulis.** FORTUNE'S DARK-STEMMED GOLDEN-BELL.

Location: Fruticetum.

Natural distribution: Central China.

Fraxinus Fortunei var. **aureo-variegata.** FORTUNE'S VARIE- GATED GOLDEN-BELL.

Location: Fruticetum.

Horticultural origin.

Forsythia Fortunei var. **pubescens.** FORTUNE'S HAIRY-LEAVED GOLDEN-BELL.

Location: Fruticetum.

Natural distribution: Central China.

Forsythia intermedia. HYBRID GOLDEN-BELL.

Location: Fruticetum. Near plaza, Harlem Railroad depot
Opposite entrance to elevated railroad.

Hybrid.

Forsythia intermedia var. **primulina.** PRIMROSE HYBRID GOL- DEN-BELL.

Location: Fruticetum.

Forsythia intermedia var. **vitellina.** DEEP-COLORED HYBRID GOLDEN-BELL.

Location: Fruticetum.

Forsythia suspensa. WEEPING GOLDEN-BELL.

Location: Fruticetum.

Natural distribution: China.

Forsythia viridissima. DARK-GREEN GOLDEN-BELL.

Location: Fruticetum. Near plaza, Harlem Railroad depot.

Natural distribution: China.

Forsythia viridissima var. variegata. VARIEGATED DARK-GREEN GOLDEN-BELL.

Location: Fruticetum.

Horticultural origin.

Syringa. LILAC

Syringa amoena. BEAUTIFUL LILAC.

Location: Lilac Garden.

Horticultural origin.

Syringa amurensis, MANCHURIAN LILAC.

Location: Fruticetum.

Natural distribution: Manchuria.

Syringa azurea var. plena. DOUBLE BLUE LILAC.

Location: Lilac Garden.

Horticultural origin.

Syringa chinensis. ROUEN LILAC.

Location: Fruticetum. Lilac Garden.

Horticultural origin.

Syringa chinensis var. alba. WHITE ROUEN LILAC.

Location: Fruticetum. Lilac Garden.

Syringa chinensis var. Saugeana. RED ROUEN LILAC.

Location: Fruticetum.

Syringa colmariensis. COLMAR LILAC.

Location: Lilac Garden.

Horticultural origin.

Syringa Emodi. HIMALAYAN LILAC.

Location: Fruticetum.

Natural distribution: Himalayan Region.

Syringa japonica. JAPANESE LILAC.

Location: Fruticetum.

Natural distribution: Japan.

Syringa Josikaea. HUNGARIAN LILAC.

Location: Fruticetum.

Natural distribution: Hungary.

Syringa Juliana. JULIANA'S LILAC.

- Location: Fruticetum.
 Natural distribution: Western China.
- Syringa Komarowii.** KOMAROW'S LILAC.
 Location: Fruticetum.
 Natural distribution: Western China.
- Syringa macrostachya.** LARGE-CLUSTERED LILAC.
 Location: Lilac Garden.
 Horticultural origin.
- Syringa Noisettiana** var. **alba.** WHITE NOISETTE LILAC.
 Location: Lilac Garden.
 Horticultural origin.
- Syringa oblata.** LINDLEY'S LILAC.
 Location: Lilac Garden.
 Natural distribution: Northern China.
- Syringa pekinensis.** PEKIN LILAC.
 Location: Fruticetum.
 Natural distribution: Northern China.
- Syringa persica** var. **alba.** WHITE PERSIAN LILAC.
 Location: Fruticetum.
 Natural distribution: Caucasus to Afghanistan.
- Syringa persica** var. **laciniata.** CUT-LEAVED PERSIAN LILAC.
 Location: Fruticetum.
- Syringa pubescens.** PUBESCENT LILAC.
 Location: Fruticetum.
 Natural distribution: Northern China.
- Syringa reflexa.** PENDULOUS LILAC.
 Location: Fruticetum.
 Natural distribution: Western China.
- Syringa spectabilis.** SHOWY LILAC.
 Location: Lilac Garden.
 Horticultural origin.
- Syringa tomentella.** LITTLE HAIRY LILAC.
 Location: Fruticetum.
 Natural distribution: Western China.
- Syringa villosa.** HAIRY CHINESE LILAC.
 Location: Fruticetum.
 Natural distribution: China to Himalayas.

Syringa vulgaris. COMMON LILAC.

Location: Fruticetum. Power house 1.

Natural distribution: Southeastern Europe to Caucasus.

Syringa vulgaris var. alba. WHITE-FLOWERED COMMON LILAC.

Location: Fruticetum.

Syringa Wilsonii. WILSON'S LILAC.

Location: Fruticetum.

Natural distribution: Western China.

The following, many of them hybrids, of horticultural origin, are also in the collections:

Aline Macquery, Antoine Buchner, Arthur Wm. Paul, Banquise, Bleuatre, Charles Baltet, Charles Sargent, Charles X, Comte de Kerchove, Comtesse Horace de Choiseul, De Jussieu, De Mirabel, De Saussure, Desfontaines, Dr. Maillot, Dr. Masters, Duc de Massa, Edmond About, Edmond Boissier, Emile Lemoine, Erherzog Johann, Etoile de Mai, Fürst Lichtenstein, Georges Bellair, Gloire de Lorraine, Godroy, Henri Martin, Hippolyte Maringer, Jeanne d'Arc, Jules Ferry, Jules Simon, La Mauve, Lamartine, Leon Gambetta, Lilarosa, Louis Van Houtte, Mme. Antoine Buchner, Mme. Casimir Perier, Mme. Lemoine, Mme. de Miller, Mme. Moser, Marechal Lannes, Marliacea pallida, Maximowicz, Merveille, Michel Buchner, Mirabeau, Miss Ellen Willmott, Montaigne, Montgolfier, Negro, Olivier de Serres, Pasteur, Paul Hariot, Philemon, Planchon, President Fallieres, President Grevy, President Loubet, President Viger, Princess Alexandra, Prof. Sargent, Prof. Stockhart, Rousard, Siebold, Souv. de L. Thibaut, Taglioni, Tournefort, Toussaint l'Ouverture, Vestale, Victor Lemoine, Viviand Morel, Volcan, Waldeck Rousseau, Wm. Robinson.

Phillyrea. PHILLYREA**Phillyrea angustifolia.** NARROW-LEAVED PHILLYREA.

Location: Fruticetum.

Natural distribution: Mediterranean Region.

Forestiera. FORESTIERA**Forestiera acuminata.** POINTED FORESTIERA.

Location: Fruticetum.

Natural distribution: Southeastern United States.

CONFERENCE NOTES FOR NOVEMBER

A conference of the scientific staff and registered students of the Garden was held on the afternoon of November 5.

Dr. P. A. Rydberg presented the results of recent studies of the genus *Harpalyce*, as follows:

"The genus *Harpalyce* was described by De Candolle from an unpublished illustration of Mocino and Sesse's *Astragalus carnosus*. Sesse and Mocino's manuscript Flora Novae Hispaniae was later published in Mexico some years ago and in it is found an *Astragalus formosus*. As De Candolle named the type species *Harpalyce formosa*, it is to be assumed that '*carnosus*' was a misprint for *formosus*. This species has remained unknown except through these meager original descriptions, tracings of Mocino and Sesse's drawings, and a reproduction of one of these published by Bentham in Hooker's Journal of Botany. Several species which evidently belong to the same genus have been collected in Mexico, Guatemala, Cuba, and Brazil, but none of these can be identified with *Harpalyce formosa*. The genus can be divided into four groups:

"1. One species from Mexico: *H. mexicana*, which has broad, thick, and woody pods and grayish pubescence, while all the other species have leathery pods and more or less ferruginous pubescence. The flowers of this species are unknown.

"2. Six species from Mexico: *H. formosa*, *H. Goldmanii*, *H. Loesneriana*, *H. hidalgensis*, *H. arborescens*, and *H. Pringlei*; and one from Guatemala: *H. rupicola*, in which the petals are subequal, the keel-petals strongly incurved and free at the tip, and the pods are broad, rather few-seeded, and sometimes only with traces of partitions between the seeds.

"3. Three Brazilian species: *H. brasiliiana*, *H. Hilairiana*, and *H. minor*, with flowers similar to those of the second group, but the keel less curved and the pods so far as known with many seeds separated by false partitions.

"4. Three Cuban species: *H. cubensis* and two closely related undescribed species, in which the petals are more fleshy and very unequal, the keel-petals being two to three times as

long as the banner and wings, only slightly falcate, and united to the apex."

Dr. H. A. Gleason spoke on "Variation in Flower-number in *Vernonia*," presenting the results of studies which have since been published in the *American Naturalist*.

"In many species of *Vernonia*, in which the number of flowers in each head is less than ten, the numbers of the Fibonacci series are followed exactly. In other species with larger heads, there is a close approximation to the Fibonacci series, with more or less variation in both directions. Detailed studies of conditions in *Vernonia missurica* Raf. show that the species presents a great variation in flower-number, with observed extremes of 22 and 62. On plants with heads sufficiently numerous to warrant drawing conclusions, the mode falls on or near a number of the Fibonacci series, usually 34, but in plants with relatively few heads this agreement may not appear. For each plant, the flower-number is quite constant, but is regularly slightly greater in the terminal head of each primary cyme."

A. B. STOUT,
Secretary of the Conference

NOTES, NEWS AND COMMENT

Mr. Kenneth R. Boynton, who has been acting as marshal of the garden school, has been appointed supervisor of gardening instruction, succeeding Captain Henry G. Parsons, resigned.

Miss Marjorie F. Warner, a librarian at The Bureau of Plant Industry, Washington, recently spent a week at the Garden studying the literature of Horticulture prior to 1800.

The following scientists have recently registered in the library: Professor A. S. Hitchcock, Dr. J. N. Rose, Dr. Neil E. Stevens, and Dr. Charles D. Walcott, Washington, D. C.; Mr. Ralph Hoffmann, Stockbridge, Mass.; Mr. A. H. Cockayne, Wewawa, New Zealand, and Miss Annie Lorenz, Hartford, Conn.

Mr. Hugh Findlay, author of "Practical Gardening," organizer and inspector of camp farms for the United States army, and later field lecturer in agriculture overseas, has registered as a research student at the Garden.

Prof. N. E. Hanson, of South Dakota, called at the Garden November 8, en route to North Carolina. The object of his trip is to secure specimens of *Rubus Millspaughii*, a spineless blackberry, to be used in breeding experiments.

Dr. L. H. Bailey, of Ithaca, New York, who is now identifying his collections of Chinese plants, visited the Garden November 12.

Prof. and Mrs. A. H. Cockayne, of New Zealand, spent some time at the Garden and at other New York institutions in October and November. Prof. Cockayne, who is the government biologist of New Zealand, is accumulating data on agricultural and scientific education and organization during a six months leave of absence. He is the son of Dr. L. Cockayne, the well-known New Zealand ecologist.

The dahlia border, which attracted hundreds of enthusiastic visitors for a period of three months, was cut down by frost on the morning of November 10, three days later than the first killing frost of the previous autumn. While in perfection of individual flowers the border was no more notable than last year, it was more remarkable in profusion of blooming and in general effectiveness, due probably to the copious rainfall of summer and autumn and to the absence of extended periods of extremely high temperatures. Twenty-four choice novelties contributed by J. J. Broomall of Eagle Rock, California, constituted a striking feature of this year's exhibit.

An extensive collection of specimens from the Rio Grande Valley, Texas, has recently been received for the herbarium. This valuable addition to our permanent collection came through Mr. H. C. Hanson who gathered the specimens while working in that botanically little known part of the United States.

A large collection of specimens of rare and interesting plants of Cuba has been received from Brother Leon. The specimens are being incorporated in the Garden herbarium.

A specimen of the rare *Anthurus borealis* Burt was brought in by Mr. Boynton on October 31, 1919, from the Gladiolus bed in the Garden grounds, where the students of the Garden School discovered it. This interesting stinkhorn is divided at the top into six narrow, hollow arms. It was first brought to our attention in May, 1911, by Dr. F. M. Bauer, who found it growing in quantity in mushroom beds on Blackwell's Island. So far as known, Mr. Boynton's specimen is the first ever collected within the New York Botanical Garden.

Several minor changes and replacements of defective stock have been made in the rose garden during the autumn. Most of these have been necessitated by inferior stock upon which some varieties of hybrid tea roses have been propagated.

The number of students in the course of instruction in gardening has steadily increased during the autumn months, until thirty-five were registered November 25. For convenience of instruction in practical work, they have been divided into three groups, while all meet together for class work. Dr. W. J. Gies has delivered lectures weekly on elementary chemistry and classes in elementary botany and garden botany are also in progress.

Meteorology for September. The total precipitation for the month was 2.85 inches. The maximum temperatures recorded at the Garden for each week were 95° on the 7th and 8th, 83° on the 21st, and 79° on the 22d. The minimum temperatures were 52° on the 5th, 51° on the 13th, 45° on the 19th, and 42° on the 27th.

Meteorology for October.—The total precipitation for the month was 2.65 inches. The maximum temperatures recorded at the Garden for each week were 90° on the 4th, 86° on the 11th,

78° on the 16th, 67° on the 26th and 84° on the 28th. The minimum temperatures were 48° on the 1st, 35° on the 13th, 39° on the 19th, and 41° on the 23d.

ACCESSIONS

LIBRARY ACCESSIONS FROM AUGUST 22 TO NOVEMBER 21.

- BLUME, CARL LUDWIG VON, & FISCHER, JOHANN BAPTISTA VON. *Flora Javæ nec non insularum adjacentium*. Bruxelles, 1828 (Given by Dr. Louise M. Browne.)
- The Catholic encyclopedia*. Vol. 16. Index. New York, c 1914. (Given by The Encyclopedia Press.)
- CHAMBERLAIN, CHARLES JOSEPH. *The living cycads*. Chicago, 1919.
- GRANT, E. B. *Beet-root sugar and the cultivation of the beet*. Boston, 1867. (Given by Dr. J. H. Barnhart.)
- KAUFFMAN, CALVIN HENRY. *The Agaricaceæ of Michigan*. 2 vols. Lansing 1918. (Given by Michigan Geological and Biological Survey.)
- LOYD, JOHN WILLIAM. *Productive vegetable growing*. Ed. 3. Philadelphia, [1918].
- MCGILLIVRAY, WILLIAM. *A systematic arrangement of British plants by W. Withering . . . corrected and condensed by William McGillivray*. Ed. 5. London, 1841. (Given by Mrs. N. L. Britton.)
- MONTGOMERY, EDWARD GERRARD. *Productive farm crops*. Ed. 2. Philadelphia, [1918].
- RADDI, GIUSEPPE. *Synopsis filicum brasiliensium*, [Bologna, 1819] Photographic copy. (Given by The Library of Congress.)
- Scientific American*. Vol. 120. New York, 1919. (Given by Scientific American Publishing Co.)
- SEARS, FRED C. *Productive orcharding*. Ed. 2 rev. Philadelphia, 1919.
- SEDGWICK, WILLIAM THOMPSON, & WILSON, EDMUND BEECHER. *General Biology*. Ed. 2 New York, 1904. (Given by Miss S. H. Harlow.)
- VAN SLYKE, LUCIUS LINCOLN. *Fertilizers and crops*. New York, 1919.
- VELENOVSKY, JOSEF. *Kvĕtena českéhoenomanu*. Prague, 1889. (Given by Dr. A. Hollick.)

MUSEUMS AND HERBARIUM

- 1 specimen of *Lepiota americana* from New York. (Collected by Dr. J. H. Barnhart.)
- 2 specimens of woody fungi from Connecticut. (By exchange with Dr. A. H. Graves.)
- 1 specimen of *Boletinus meruloides* from New Hampshire. (By exchange with Mr. W. H. Shell.)
- 1 specimen of *Grifola Berkeleyi* from Alabama. (By exchange with Mr. J. E. Fries.)
- 34 specimens of fungi from Virginia. (Collected by Dr. W. A. Murrill.)

- 1 specimen of *Spongipellis fissilis* from Minnesota. (By exchange with Miss F. Jean MacInnes.)
- 12 specimens of boletes from Connecticut. (By exchange with Prof. H. L. Wells.)
- 3 specimens of fungi from Colorado. (By exchange with Prof. E. Bethel.)
- 1 specimen of *Typhodium typhinum* from Yosemite Valley. (By exchange with Prof. W. C. Blasdale.)
- 2 specimens of fungi from Connecticut. (By exchange with Dr. Robert L. Morris.)
- 2 specimens of *Ganoderma sessile* from New Jersey. (By exchange with Mr. Edwin Fowler.)
- 1 specimen of *Chlorosplenium aeruginosum* from Pennsylvania. (By exchange with Master R. Delafield.)
- 2 specimens of fungi from Minnesota. (By exchange with Miss F. Jean MacInnes.)
- 1 specimen of *Lycoperdon rubroflavum* from the New York Botanical Garden. (Collected by Miss M. E. Eaton.)
- 3 specimens of fungi from Pennsylvania. (By exchange with Mrs. V. W. Delafield.)
- 4 specimens of fleshy fungi from Connecticut. (By exchange with Dr. R. L. Morris.)
- 3 specimens of discomycetes from New York. (By exchange with Mr. Chardon.)
- 6 specimens of discomycetes from New York. (Collected by Dr. F. J. Seaver.)
- 1 specimen of *Pholiota* from Montana. (By exchange with Prof. P. W. Graff.)
- 1 specimen of *Inonotus amplexus* from Florida. (By exchange with Dr. G. Clyde Fischer.)
- 2 specimens of *Melanoleuca pallida* from Connecticut. (By exchange with Dr. R. T. Morris.)
- 2 specimens of *Spongipellis* from Minnesota. (By exchange with Mr. Freeman Weiss.)
- 1 specimen of *Grifola flavorivens* from Wisconsin. (By exchange with Mrs. M. Guinotts.)
- 6 specimens of fungi from Ontario. (By exchange with Dr. H. A. Kelley.)
- 2 specimens of fleshy fungi from New York Botanical Garden. (Collected by Mr. Felix F. Wilmousky.)
- 1 specimen of *Stropharia* from Canada. (By exchange with Prof. J. H. Faull.)
- 6 specimens of fungi from California. (By exchange with Dr. Arthur S. Rhoads.)
- 1 specimen of *Calostoma cinnabarinum* from Lake Mohonk, New York. (Collected by Dr. N. L. Britton.)
- 6 specimens of fungi from Stamford, Connecticut. (Collected by Dr. T. Morris and Dr. W. A. Murrill.)
- 1 specimen of *Auriscalpium Auriscalpium* from New York. (By exchange with Mrs. W. C. Smith.)
- 6 specimens of *Geaster hygrometricus* from The New York Botanical Garden. (Collected by Mr. H. W. Becker.)
- 2 specimens of fungi from Ohio. (By exchange with Mr. W. R. Lowater.)
- 1 specimens of *Crepidotus malachias* from Minnesota. (By exchange with Miss F. Jean MacInnes.)

3 specimens of fungi from Kentucky. (By exchange with Prof. Frank L. McFarland.)

3 specimens of fungi from Cuba. (By exchange with Brother Hioram.)

2 specimens of fungi from Ithaca, New York. (By exchange with Prof. H. M. Fitzpatrick.)

1 specimen of *Peziza sylvestris* from Pennsylvania. (By exchange with Dr. L. O. Overholts.)

1 specimen of *Funalia stuppea* from Minnesota. (By exchange with Mr. Freeman Weiss.)

100 specimens, "Mycotheca Boreali-Africana" fascicles 13, 14, 15, 16. (Distributed by Rene Maire.)

3 specimens of *Persicaria*. (Given by Mr. William C. Ferguson.)

5 specimens of *Callitricha heterophylla* from New York. (Given by Dr. Romyn Hitchcock.)

9 specimens of Hepaticae from New England. (By exchange with Miss Annie Lorenz.)

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JOURNAL
OF
The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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THE AIMS AND METHODS OF PLANT BREEDING

During the past three decades much attention has been paid to experimental studies bearing on heredity, variation, and evolution. Departments of plant and animal breeding (or "genetics") have been developed in many institutions with the aim of determining fundamental principles. In agricultural experiment stations especially, a very general effort has been made to apply methods and doctrines in securing practical results. Commercial concerns have paid much attention to the development of experimental plots and testing grounds in which new varieties are produced for the farm, the orchard, and the flower and vegetable garden. Special attention has also been directed to the application of theories of heredity to human affairs through what is now called the science of "eugenics." Several popular and technical journals are devoted wholly or in part to the publication of articles bearing on genetics and eugenics, and books on various aspects of these subjects are now numerous. Thus the results of practical and theoretical interests have become rather widely disseminated, and very generally read and discussed.

The advance of knowledge in several lines of popular and scientific interest has contributed to the present-day development of genetics. Especially is this true of the art of plant breeding and the important place that experimental work with plants has taken in studies of heredity.

Considered in its broad sense, plant breeding through the selection of seed-parents is as old as the art of agriculture. The

development of many, if not all, of our most important economic plants was clearly not merely a matter of bringing wild forms under cultivation. Many races of plants especially adapted to the needs of man had been produced by selection before the days of written history. Many species of cultivated plants have become so changed during the period of cultivation that their ancestry is not known with certainty.

In the more modern sense, plant breeding has come to mean the maintenance of types and the production of new types through direction and control of the natural processes of self- and cross-fertilization. The methods of plant breeding are hence based on a knowledge of sexuality in plants. It was the discovery of sex in plants and the development of methods of controlling its operation that laid the basis of modern plant breeding.

This discovery was made more or less independently by several investigators. An English botanist, Nehemiah Grew, in a lecture before the Royal Society in 1676, very clearly states the fact of sex in plants and credits Sir Thomas Millington with determining the point. To what extent the observations involved definite experiments is not recorded. The credit of first clearly demonstrating sex in plants by experiment is very generally given to the German botanist Camerarius. The account of his experiments and conclusions was recorded in the form of a letter written in 1694 and first published that same year and again in 1696 in volumes that are evidently among the rarest of botanical publications. The letter was again printed in 1749 as a part of a small volume in which it seems to have received wider distribution. More recently (1899) it was translated into German and printed, in which form it is most available today. About the year 1737 an American, James Logan, then Governor of Pennsylvania, made some carefully planned experiments which demonstrated sex in Indian corn. Logan was evidently unaware of any previous observations on this point except those of Sir Thomas Millington.

In the year 1718 it was recorded that Thomas Fairchild had already produced by experimental methods a hybrid between

the Sweet William and the Carnation. Evidently this is the first hybrid of which there is definite record thus produced between two distinct species. Mention of this hybrid is made by Richard Bradley, later a professor of Botany at Cambridge University, England, in his book "New Improvements of Planting and Gardening." The first edition of this volume was published in 1717 and at least six other editions followed within twenty-two years thereafter. In the second edition published in 1718 (the earliest that the writer has thus far seen), under the topic "Generation of plants," the facts of sex in plants are well stated. Here one Robert Balle is cited as having been well acquainted with such facts for "above thirty years." The general functions of the parts of the flowers in seed production are well described, and experiments proving the points are mentioned. Furthermore numerous cases of variation among a seed progeny are attributed to cross-fertilization between different varieties. The desirability of selecting seed parents from best plants that are kept in isolation from poorer sorts is also emphasized.

Gradually the facts regarding sexuality in plants became more generally known to those interested in plants and in plant breeding and accordingly influenced the course of experimental work. The hundred years between 1760 and 1860 were productive of much study of hybridization in plants. Studies in the field of selection did not receive much special attention, if we may judge by the published records of the time, until during the latter part of this period.

In Germany, Koelreuter (publications from 1761 to 1766), Wiegmann (1828), and Gärtner (1849) were conspicuous workers in the hybridization of plants. The last spent some twenty-five years in making over 10,000 experiments in which about 250 different hybrids were produced. For the memoir embodying the results and conclusions of his studies, Gärtner received a grand prize offered by the Dutch Academy of Sciences. In England, Knight (various publications from 1806 to 1841) was a conspicuous worker in the field of horticulture, and Goss (1824), Herbert (1819 to 1837), and Seton (1824), contributed

important scientific work in hybridization. Meanwhile similar study was being made by French investigators of whom must be mentioned Sageret (1826), Locoq (1827-1862), Godron (1844-1863), Naudin (1855-1864) and Wichura (1865).

Much important research was done by the hybridists of this period, many of whom held views far in advance of their time and even clearly stated some of the ideas of modern plant breeders. Beginning with Knight there were those who noted that new and important varieties can be obtained through hybridization. The thought of the time was however largely dominated by views of the fixity of species. This influenced and in considerable measure determined the course of experimental studies. Much of the hybridization work aimed to obtain evidence on the relationships of species. Evidence was sought as to what forms would cross, whether the offspring were impotent or fertile, and whether the parent species could be obtained again in the hybrid progeny. Much discussion centered on the dogma that the production of fertile hybrids is proof that the parent types are not two distinct species. The literature of the time clearly reveals the wide range of results to be obtained in hybridization. This is shown especially in the general survey of the entire field made by Gärtner (1849).

During this period the work of the plant hybridizer was held in disrepute in the popular mind and in ecclesiastical circles. It was felt that such endeavor was a sacrilege which invoked decidedly abnormal processes. That the processes of fertilization are normal and are involved (with few exceptions) in all seed reproduction received strong support from the now famous work of Christian Konrad Sprengel (1793) revealing the very general adaptations for cross-pollination and the role of insects in distributing pollen. Soon after this date attention began to be directed to methods and results of selection in the improvement of cultivated plants. Undoubtedly this work was stimulated by the results of hybridization and the knowledge that cross-pollination is very general in nature.

Van Mons, a professor of chemistry and physics at the University of Louvain, and LeCouteur, of the Isle of Jersey, were

evidently the first, or at least among the first, to record the use of intensive methods of selection. Van Mons (monograph published in 1835) studied the seed progeny of fruit trees, mostly of pears. As these had been propagated by vegetative means and as some varieties of pear must be cross-pollinated if seed is produced, some of Van Mons's success in developing new varieties may perhaps be attributed to the results of cross-fertilization. LeCouteur studied wheat, which is grown entirely from seed and is adapted to self-fertilization. In 1836, LeCouteur described his methods as follows: "I proceeded to put into practice what had occurred to me to be the only secure mode to ensure the growth of pure sorts of wheat; namely, to grow them from single grains, or from single ears, and to follow up the plan, by afterwards sowing only the produce of the most productive, so as to form a stock."* At this time he had in cultivation more than 150 varieties and subvarieties of wheat. Patrick Shirreff, a Scottish agriculturist, whose work began about the year 1819 and continued for about 60 years, employed quite the same methods of selection in cereals. Still more accurate methods of pedigree and of testing and comparing the progeny of a line were developed by Hallett, whose work began about 1857.

The improvement and development of commercial varieties of the sugar-beet through selection should be mentioned in this connection. The existence of sugar in the beet was discovered in 1747 and attempts to start a beet-sugar industry were made as early as 1801. The extraordinary cost of cane sugar on the continent during the blockade of the Napoleonic wars led to the establishment of beet-sugar factories in Germany and France. With the fall of Napoleon I, the industry failed in Germany but continued to exist in France, where the improvement of the sugar beet was taken up by the firm of Vilmorin-Andrieux. Louis de Vilmorin, who directed the affairs of this eminent firm from the year 1843 until his death in 1860, became a specialist in breeding the sugar beet by selection. At first the selection of seed parents was based on such characters as size and shape of roots, but later

* On the Varieties, Properties and Classification of Wheat, p. 17.

(about 1850) determination of saccharine content became an important factor in determining seed parents. Rather special methods of studying the progeny of pedigreed stock were also devised. Selection for high sugar content soon raised the average product of the field crop from 7-8 per cent. to 14-16 per cent and this has been an important factor in the modern development of the beet-sugar industry. Repeated and regular selection is, however, necessary to maintain this average but this has been greatly facilitated by the discovery in recent times of simpler and more accurate methods of determining the sugar content.

The main object of the pedigree methods developed in breeding cereals and sugar-beets was to sort out valuable strains and to keep them pure by preventing cross-fertilization between them or with poorer strains.

The popular and, to some extent, the scientific point of view decidedly shifted in the middle of the last century, largely due to the now famous publications of Charles Darwin. A mass of evidence was presented by him showing that animals and plants are continually developing hereditary variations under domestication. It was pointed out that the old, old method of selection had always been an efficient means of improving cultivated plants and animals. It was maintained that, through the accumulation of hereditary variations by natural selection, new and quite distinct species develop from a common ancestor. This doctrine attracted attention to the practical results to be obtained through the selection for desirable qualities. Many conceptions as to the methods of evolution were advanced, and theories were formulated regarding the causes of variation and the mechanism of hereditary transmission.

Hybridization thus became recognized as a natural means of inducing variation and its use in practical breeding work became more general. Artificial selection was conceived to be effective in accumulating slight variations as well as in isolating marked sports that appear. Thus two methods of selection developed. One was based on close or line pedigree of the progeny of individuals of conspicuous merit. The other method, known as "mass selection" aimed at the continuous improvement of a

stock as a whole; a number of individuals were involved instead of one in the selection of parents. Methods of mass selection were developed, especially by breeders of cereals and sugar-beets in Germany and France.

The next great step which contributed to a better understanding of the physiology of reproduction and heredity came through the extension of knowledge regarding the minute structure and organization of cells, of the mechanism of cell divisions, and of the behavior of the parts of the cell in spore formation and in fertilization. For a long time discussion had been rife and often bitter as to what each of the parents contributes to the offspring. One school of thought maintained that the egg cell supplies the physical material needed for the transmission of hereditary qualities. Another school held that the sperm supplies these materials. Certain hybridists, however, who had observed that reciprocal hybrids very often give quite identical progeny, concluded that egg and sperm contribute germ plasm equally. These points of contention were largely settled between the years 1870 and 1890, by the revelations of the microscope. The cells, already recognized as the units of structure of the living organism, were found to consist of different parts which undergo various development in the processes of growth and division. The most permanent of the structures are the rod-shaped pieces of what is called germ plasm. These units, known as chromosomes, are found to be remarkably constant as to size, shape, and number in all body cells of all individuals of a race or species. It was found that the two sex cells which fuse in fertilization contribute, except in special cases, an equal number of these visible units of germ plasm. The plant or animal into which a fertilized egg develops is therefore a dual organism with cells containing a double number of pieces of germ plasm: maternal and paternal chromosomes live side by side in the cells and when the cells divide the mechanism gives normally an equal division of all the units. When spores are formed (from which sex cells arise directly or indirectly) the mechanism gives an intimate mixing or fusion of the two sets of units, followed by the reappearance of the same number of units and their separa-

tion into two groups. The resulting spores and later the sex cells possess therefore only half of the number of chromosomes. Fusion of the sex cells in pairs gives again the double number in the new generation of spore-producing individuals.

These discoveries attracted attention to the continuity of the germ plasm, to the individuality of its units, and to the possibility that these may possess qualitative values as bearers of hereditary characters.

In general the main aspects of these observations were well established by the year 1890. The time was therefore most opportune for the so-called rediscovery of Mendel's laws of hybridization, originally published in 1866. The essence of these conceptions is that characters are the units of heredity and are represented and transmitted as such by independent units of germ plasm. In a hybrid of the first filial generation (abbreviated as F_1), one of a pair of contrasted parental characters tends to be dominant and the other tends to be latent or recessive and thus disappears temporarily. Thus the members of this generation exhibit only the character of one parent. In the processes of spore formation in the individuals of this generation and in the fertilizations immediately following, the unit characters are redistributed and recombined in pairs by chance. Thus a dominant and a recessive pair of characters from two parents are considered to become reassembled in the second hybrid generation in the following ratio: (1) dominant with dominant: (1) dominant with recessive: (1) recessive with dominant: (1) recessive with recessive. Various investigators previous to Mendel had utilized the method of comparing pairs of contrasted characters and had observed that characters often segregate with decided purity in the hybrid offspring and that the second generation usually differs from the first in range of variation and in the reappearance of the various parental characters. All that was really new in Mendel's method was the making of counts which revealed the evidence that the segregation may be in simple mathematical ratios.

Thus if the parents crossed differ in two pairs of characters, one of which is dominant from each, the young embryo plants

of the F_1 generation will all exhibit the dominant qualities and the F_2 will exhibit all combinations of dominant and recessive characters. To refer to Mendel's studies with garden peas, when a yellow wrinkled strain is crossed with a green round strain the immediate offspring (the embryo peas in the seeds) are yellow and round with the characters green and wrinkled recessive. In the next generation all possible recombinations give the following combinations and ratios.

In the following notation the dual composition of the plant upon which the transmission of characters depends and the appearance of the plant through the expression of characters are both indicated by printing the names of dominant characters in capitals and the names of recessive characters in small type. Recessive characters come into expression only where they exist free from the paired dominant.

According to Mendelian interpretation the second generation in the case in question should be as follows:

- (I) 1 (YELLOW YELLOW, ROUND ROUND):
 2 (YELLOW green, ROUND ROUND):
 2 (YELLOW YELLOW, ROUND wrinkled):
 4 (YELLOW green, ROUND wrinkled):
- (II) 1 (YELLOW YELLOW, wrinkled wrinkled): 2 (YELLOW green, wrinkled wrinkled):
- (III) 1 (green green, ROUND ROUND): 2 (green green, ROUND wrinkled):
- (IV) 1 (green green, wrinkled wrinkled).

In respect to appearance, the plants of the second generation (in this case, the embryos of the seeds produced by the F_1) fall into four classes. Nine seeds out of every 16 seeds (the group I above) will, it is assumed, be yellow and round; three (the group II) will be yellow and wrinkled; three (the group III) will be green and round; and one (of the group IV) will be green and wrinkled. But only one of each group (the first mentioned) will breed true for both pairs of characters; in one of these the two pairs of dominant characters are combined, and in one the two pairs of recessive characters are combined. This emphasizes the fact that sister plants of the second hybrid generation

which look the same may breed quite differently, and that only a few of them will breed true for the new combinations of parental characters.

According to this conception, hybridization can not produce new characters. All it can do is to redistribute and recombine those already existing in the parents. The theory decidedly changed the methods of analyzing the experimental results. All the variability appearing in a hybrid progeny was conceived to be due to recombination that could be described, expressed and represented by mathematical formulae. As to methods, the doctrine emphasized the value of making pedigreed cultures in selecting for a pure strain in which new combinations appeared. The breeding or progeny test was established as the proper test of the qualities in the two sets of germ plasm. The recognition of dominance and recessiveness makes a distinction between the expression of characters and their transmission in a latent form.

The conception of units of germ plasm representing characters led to the development of the modern doctrine of mutation (deVries, 1901). This maintained that new unit characters arise suddenly and spontaneously and are fully hereditary from their first appearance. Sharp distinction was made, in thought at least, between hereditary variation and non-hereditary variation due to environment.

The simplicity of the original doctrines of Mendelism and of mutation attracted attention. The theory of heredity presented seemed readily understood by all. It was strongly supported by the known facts regarding germ plasm as well as by much experimental evidence. The promise of the sudden appearance of hereditary units, and of the possibility of recombining them as independent units made definite results in practical breeding appear certain. In the period from 1890 to date an immense amount of experimental study has been directed to the application and testing of these theories of heredity and evolution. Of late, evidence has especially been sought regarding the arrangement of units of germ plasm and of their association in groups (= linkage). The thought of the time has been that there must be units of germ plasm and that the results of hy-

bridization must be interpreted on this basis. Many theories have been advanced thus to explain the aberrant ratios and the marked variations so frequently observed. It is perhaps too soon to judge what will be the verdict of time on the theories, but some points of fact seem certain.

It is very clear that in hybridization few characters behave as if represented by units of heredity and thus follow closely the ratios outlined above for characters in peas. Most of the apparently simple pairs of characters split into a large number of intermediate forms, and the grouping of the progeny into definite classes is most difficult. A vigorous attempt has been made by many neo-Mendelians to explain such results in terms of units or factors that interact or modify each other in producing a single character. Thus a single character, as the eye color of the wild fruit fly (a character most intensively studied) is now assumed to be due to the interaction of at least 50 different units. The doctrine of the independent and single effect of units of germ plasm, a fundamental feature of the original Mendelian theory, has however been largely abandoned. The factors concerned with the transmission and expression of eye color have, it is assumed, something to do with the heredity of every other character of the organism. The conception of multiple modifying factors recognizes that quite new qualities may appear after two strains are crossed but attempts to explain them as due to new reactions between units of germ plasm already present in the parents.

Meanwhile abundant evidence has accumulated which shows that spontaneous hereditary changes of slight magnitude frequently occur. The distinction between "mutations," slight and continuous variations, and "recombinations" has become largely one of definition. Furthermore a survey of the best and most marked cases regarded as mutations, scarcely affords a single case to which a conservative systematist would give specific rank. Distinct species, evidently arise from a common ancestor by a series of divergent hereditary variations. The main features of the Darwinian doctrine of evolution continue to be substantiated. Research has however established that the germ plasm

is the seat in which most of the hereditary changes occur, and that purely external conditions are less directly involved in producing variations than was formerly believed.

As to results, the experimental studies agree very closely with the experience of the ages. When special attention is paid to the propagation of an organism, the effort to secure new varieties often meets with decided success. The large number of "mutant" races of the fruit fly and of the evening primrose are conspicuous examples of this in the field of experimental study. Of the many cases that have arisen in the practice of floriculture, the development of the modern varieties of *Dahlia* may be mentioned. It is recognized that there are about 6,500 varieties of the *Dahlia* in cultivation in the United States. All of these have descended from a single American species during the past 130 years, and the many hundreds of cactus dahlias have all appeared since 1879. The wild species is somewhat variable as to color of flowers and semi-doubleness of heads. In propagating the plant, growers have selected further from variations that have appeared spontaneously or as a result of crossing between varieties. A collection of the principal types of the *Dahlia*, such as is grown for display at the New York Botanical Garden, is "a most remarkable example of what nature's tendency to variation can do in a short time, when aided and encouraged by man."*

The horticultural history of the annual Phlox (*Phlox Drummondii*), a review of which has been presented to the readers of this Journal,† affords a case similar to that of the Dahlias. It seems certain that all of the 200 varieties of the annual Phlox have descended from a single stock of the wild Texan species which was introduced into cultivation in 1835. Many other cases well chronicled in modern horticultural literature could be cited which illustrate the possibilities of selection when a wild species is submitted to intensive breeding.

The many interesting and beautifully flowered rose-mallows sold by nurserymen are familiar to many readers of this article. These were developed by hybridizing two, and possibly three,

* Dahlias and their Culture, by M. A. Howe, *Jour. Hort. Soc. of N. Y.*, 2: 285-301.

† Cultivated Varieties of Phlox Drummondii, by James P. Kelly, *JOUR. N. Y. BOT. GARDEN*, 16: 179-191.

wild species. The hardy habit of growth of a species native to the northeastern United States was combined with the more brilliant flower colors of a species of the southern United States. In experiments at the New York Botanical Garden, the second generation of hybrids between two wild species of rose-mallow gave a most remarkable range of types with respect to color of the flowers. Some are more deeply and brilliantly colored than either of the parent species, a result frequently attained in hybridization.

It has long been recognized that the intermediate between two contrasted parental characters very often appears in hybrids. Even when characters tend to segregate as Mendelian units or as groups of units some of the second generation may be intermediates. The value of these as material for selection in producing new races is obvious. Recent studies with corn have emphasized this aspect of plant breeding in showing that quite a new type of "meal" corn can be obtained by selecting for intermediates between sweet and dent or flint races. As a rule Mendelian interpretations have disregarded the intermediates which appear, but the possibility of securing qualitative intermediates between pairs of contrasted characters which will breed true is becoming generally recognized.

Perhaps the most striking cases of spontaneous variation are those of "bud sports." During the vegetative development of an individual plant, a bud or a part of a bud gives rise to parts differing from the rest of the plant. Propagation of these bud sports, especially by vegetative means has always been very effective in developing new races. The large number of sport varieties of the Sword-fern have thus been obtained in recent years.*

By propagating from bud sports of the variegated *Coleus* the writer was able to secure in the course of three years 16 different types or varieties. The frequent occurrence and the economic significance of bud variations giving a poor quality of fruit has recently been noted by specialists of the United States Department of Agriculture in studies of citrus fruits grown in California.

* Some Modern Varieties of the Boston Fern at their Source, by R. C. Benedict, JOUR. N. Y. BOT. GARDEN, 16: 194-197.

The breeders of plants and animals, whether prompted by practical or by scientific interests, have gained many points of guidance from the results of the intensive studies prosecuted during the past 30 years. Experimental studies in hybridization very fully support the inferences based on the knowledge of the dual nature of the spore-producing organism and of the observed behavior of germ plasm units in fertilization: (1) that the variation to be expected from hybridization first appears in the second filial generation; (2) that parental characters tend to segregate in this generation; (3) that characters of the parents can thus be combined; and (4) that an intermediate between a pair of contrasted parental characters can often be obtained. The second generation should therefore be grown in sufficient number to give chance for the range of recombinations and variations. Selection for new races should be begun with individuals of the second generation. Because of the dual nature of the spore-bearing plant, sister plants that appear quite alike will often breed differently from seed, especially for characters that are dominant. Because of this, selection for new races should be begun with several lines of self-fertilized descent.

Experimental studies have fully established the merits of methods of controlling pollinations and of growing pedigreed lines. The simple expedient of "bagging," or enclosing flowers in semi-transparent paper bags, is an efficient means of control. When cross-pollination is to be made the stamens should be removed before any pollen is shed. Proper pollination can be made when the pistils are receptive. Labelling flowers, collecting and planting seed, and growing sister plants together in pedigreed lines are matters of detail and record. Such methods eliminate uncertainty as to parentage, and are recognized as necessary in all exact studies. The efficiency of these methods in securing accuracy and in saving time should lead to their more general application by amateur gardeners and commercial seedsmen and nurserymen.

Methods of pedigreed culture with selection within a species or variety and without hybridization will usually show whether variations that may appear are hereditary. Such methods have

in recent years led to much improvement in many of our most important cultivated crops.

In the sugar beet selection has isolated if not developed *elite* races whose cultivation has decidedly increased the percentage of sugar and thus raised the total of sugar produced. Similar results have been attained in securing strains of corn, wheat, rye, barley, oats, rice, cotton, flax, and other crops that are best adapted to the conditions of various parts of the world. In plant breeding the pedigreed strain has acquired much the same significance that it has long held in the breeding of animals.

Experience has emphasized the necessity of continued selection. Cultivated races of plants are as a rule already highly specialized. Heredity tends to keep them thus, but variation tends to introduce new or at least other hereditary features. In many cultivated races evolution seems to have reached its limit, at least in the development of desirable qualities, and many variations or "reversions" appear which give poorer strains. The application of methods of selection is needed to sort out and eliminate these.

Many of our important economic plants are annuals and a new crop is grown from seed each year. Each seed produced involves a fertilization which brings two sets of germ plasm into intimate relationship. There is abundant opportunity for hereditary units to reassemble in every possible relationship, of which some may be quite new. There is opportunity for chemical interactions that of themselves may form the basis of new hereditary qualities.

Studies in genetics aim to discover those laws of heredity and variation which reveal the physiology of reproduction. Much knowledge has been gained in recent years regarding the transmission of units of heredity. Evidence of the frequent occurrence of "mutations" has accumulated. Much remains to be learned regarding the development of characters in the organism and of the causes of hereditary mutations.

In practical application, the methods of plant breeding aim (1) to maintain in a highly productive condition races whose qualities make their cultivation desirable, (2) to recognize and

preserve new characteristics which may lead to further improvement, (3) to combine qualities of different strains into one strain through crossing, and (4) to induce hereditary variations through hybridization. Plant breeding aims to regulate, to control, to direct, and to utilize the processes of heredity and variation.

A. B. STOUT

CONFERENCE NOTES FOR DECEMBER

The regular monthly conference of the Scientific Staff and Registered Students of the Garden was held on the afternoon of December 3. The program consisted of reports by Dr. F. J. Seaver and Dr. Wm. A. Murrill on "Summer Field Meetings of Pathologists and Mycologists in New York and Connecticut."

An abstract of Dr. Murrill's report is as follows:

The science of plant pathology, or the investigation and control of diseases of plants, particularly those caused by fungi, has been pushed forward of late with greater rapidity in the United States than in any other country.

During the period of the war, experts in this field from the different states coöperated very closely to save as much as possible of every crop from the ravages of disease; and during the past summer, the idea of coöperation was continued and extended with great success. In the neighborhood of New York City, two important field meetings were held, one on Long Island and one at New Haven, Connecticut, for the study of diseases common in those localities.

The first meeting, in June, for the study of potato diseases in particular, was attended by about one hundred plant pathologists representing many parts of America, England, and Holland. The farmers furnished motor-cars and tours were arranged to the chief potato-growing sections of Long Island. In the evenings, mosaic, leaf-roll, wart disease, and other potato troubles that have been found difficult to combat were discussed at length, with the best experts in the world on the spot to consider the best methods of control.

The second meeting was held in Connecticut in August and was attended chiefly by experts from New England and New York. Automobile tours covering a distance of three hundred miles were made to plantations, gardens, and nurseries between New Haven, Hartford, and Storrs; while every evening of the week was devoted to papers and discussions.

The largest greenhouses in America were seen at Cromwell, where 22 acres are under glass, one house being 800 feet long and another 500 feet square, the latter entirely filled with roses.

The largest elm in the United States was seen at Wethersfield. It is 30 feet in circumference, 97 feet high, and 250 years old. It stands on the edge of the highway without protection of any kind.

A day was spent in the tobacco-growing regions of Connecticut, where broad-leaved tobacco is grown in the open and narrow-leaved varieties are cultivated under tents. At one place, about 290 acres were grown under cloth at a cost of a million dollars. The variety thus raised sells for over a dollar a pound. No wonder that mosaic, burn, root-rots, and other tobacco diseases are studied with great care! This year the yield of tent-tobacco was enormous, probably owing to the frequent rains.

Dr. Fred J. Seaver first described a collecting trip to Ithaca, New York, June 2-7. This was in collaboration with representatives of Cornell University, the Brooklyn Botanic Garden and Syracuse University, and its purpose was the collection and study of fungi, especially of the parasitic groups and the ascomycetes.

On arrival in Ithaca Sunday evening, June 2, it was found that Professor Whetzel had the detail of the week's stay well planned. This was to consist of three rather extended excursions by automobile and train, interspersed with shorter trips to points within easy reach of the Cornell University campus, and also some time was to be spent in the laboratory taking care of the material collected.

The first trip, on Monday, June 3, was to Enfield Gorge, about seven miles from Ithaca. The party was taken by automobile in the morning and returned late in the evening, so that the entire

day was spent on the collecting grounds. A number of cup fungi and other species of especial interest were collected.

The next long trip was to Labrador Lake, about forty miles from Ithaca. This trip also yielded interesting results. The third and last of the long trips was on Saturday to the McLean woods and bogs. This region was exceedingly interesting because of the variety of local conditions, and much more time could have been advantageously spent there.

The collections made during the week were divided into three parts, most of the parasitic fungi being left with the University. Certain specimens were taken by Dr. Olive of the Brooklyn Botanic Garden, and most of the ascomycetes, including all of the cup fungi, were brought to New York by the writer. Three duplicate sets were made, one for each of the three institutions represented, the University furnishing suitable labels. The week's field-work added over two hundred specimens to our fungus collections, and some of these will undoubtedly be of more than usual interest.

Dr. Seaver also described a two days trip with the potato pathologists on Long Island, as has been noted above by Dr. Murrill. An account of this latter event has already appeared in the JOURNAL for August (p. 162).

A. B. STOUT,
Secretary of the Conference

GREENHOUSE LECTURES

FEBRUARY AND MARCH, 1920

Free Public Lectures will be delivered in the Central Display Greenhouse, Conservatory Range 2, of the Garden, Bronx Park, Saturday afternoons at 3:15 o'clock:

February 21. "The Cactus Family," by DR. W. A. MURRILL.

February 28. "Plants with Variegated or Colored Foliage," by DR. A. B. STOUT.

March 6. "House Plants," by MR. G. V. NASH.

March 13. "The Pineapple and Its Relatives," by W. A. MURRILL.

March 20. "Forcing Bulbs for the Home," by DR. M. A. HOWE.

March 27. "The Calla Lily, and Its Relatives," by MR. G. V. NASH.

The lectures, which occupy half an hour, will be illustrated by living plants and followed by demonstrations in the green-houses.

Conservatory Range 2 is situated at the eastern side of the Botanical Garden, north of the Allerton Avenue Entrance. It is most conveniently reached from the Allerton Avenue Station on the White Plains Road Extension of the Subway from East 180th Street. The Conservatory is open to the public daily from 10 to 4.

NOTES, NEWS AND COMMENT

Dr. and Mrs. N. L. Britton and Dr. J. K. Small spent most of December in Florida, with headquarters at Miami. This expedition is a continuation of the recent work of exploration in the Everglade region of southern Florida, which has already been mentioned in this Journal and some of the results of which have been published (JOURNAL 20: 21-39, 191-207. 1919).

The enrollment in the courses of instruction in gardening has increased steadily during the autumn months and at the time of going to press included forty-one students. All but two of these are discharged soldiers or sailors, in training under the Federal Board of Vocational Education. The large registration has necessitated the employment of a third instructor who will devote his entire time to this work, beginning January 1, 1920. Mr. Elba E. Watson, M.A., of the University of Illinois, has been appointed and will take the classes in botany, leaving the practical instruction in gardening and greenhouse work to Mr. Kenneth R. Boynton, supervisor of gardening instruction and Mr. Walter Balch, assistant.

Late in the summer of 1919, the Department of Parks was given an appropriation for the construction of a drive connecting the present Mansion drive with Bronx Park East, and extending past the northern side of the Rose Garden. Work has progressed steadily, and the drive when completed will form an important link in the Garden's system of roads. At the same time, considerable work has been accomplished in the construction of footpaths near the Rose Garden and near the Iris Garden entrance at Pelham Parkway.

Dr. W. A. Murrill lectured at Yama Farms Inn, November 8, on the subject of "Edible and Poisonous Mushrooms."

During November Dr. Francis W. Pennell spent some days in Charleston, South Carolina and verified certain type-specimens in the Elliott Herbarium in that city. This collection—the work of Stephen Elliott whose "Sketch of the Botany of South Carolina and Georgia," published exactly a century ago, is the most classic flora of the South—is in the care of the Charleston Museum, and is appreciated at its real worth. It is pleasing to find an historic herbarium so guarded, and also to find it located in the immediate region to which its value pertains. What recent student of our southeastern plants has not wished that the yet older, and much more difficult, herbarium from South Carolina—that of Thomas Walter—had never crossed the ocean, even though it has found a home in the British Museum!

The following visiting botanists have enrolled in the library since the last issue of the JOURNAL: Professor Charles S. Boyer, Philadelphia, Pa., Harold W. Pretz, Allentown, Pa., and Professor W. A. Setchell, Berkeley, Calif.

Dr. W. A. Setchell, who is enjoying a sabbatical year of absence from his duties as head of the department of botany at the University of California, spent several weeks in December and January at the Garden, studying some of the brown seaweeds of the Pacific Coast. A critical monograph of the blue-green algae

(Myxophyceae) of the Pacific Coast, by Professor Setchell and his colleague, Dr. N. L. Gardner, has recently been published, and the manuscript for a similar volume on the green algae (Chlorophyceae) of the same region is now ready for the printer.

An informal conference of city, state, and voluntary agencies interested in nature-study and garden work for children was held at the residence of Mr. Adolph Lewisohn, 881 Fifth Avenue, on the afternoon of December 2. A large number of representatives were in attendance and the meeting was a very enthusiastic one. The Garden was represented by Dr. W. A. Murrill.

Meteorology for November:—The total precipitation for the month was 2.81 inches. The maximum temperatures recorded at the Garden for each week were 56° on the 9th, 60° on the 10th and on the 18th, and 63° on the 30th. The minimum temperatures were 32½° on the 3d, 28° on the 10th, 22° on the 16th, 24° on the 21st, and 32° on the 29th. The first hard killing frost of autumn was on the morning of the 10th.

ACCESSIONS

MUSEUMS AND HERBARIUM

- 41 specimens of Italian marine algae. (By exchange with Egidia Corti.)
- 2 specimens of flowering plants from North Carolina. (By exchange with Mr. C. D. Beadle.)
- 1 specimen of *Bartonia verna* from Florida. (Given by Mr. Severin Rapp.)
- 4 specimens of mosses from Minnesota. (By exchange with Professor John W. Holzinger.)
- 38 specimens of mosses from Oregon, Washington, Alaska, and Java. (By exchange with U. S. National Museum.)
- 14 specimens of mosses from Florida. (By exchange with Mr. Severin Rapp.)
- 11 specimens of mosses from the Bahamas. (Collected by Mr. L. J. K. Brace.)
- 32 specimens of mosses from Iceland, North Carolina, and Tennessee. (By exchange with Professor A. LeRoy Andrews.)
- 81 specimens of mosses from North Carolina and New York. (Given by Dr. J. K. Small.)
- 2 specimens of mosses from Virgin Islands, West Indies. (Collected by Mr. W. C. Fishlock.)
- 30 specimens of hepatics and mosses from Texas. (By exchange with Dr. F. McAllister.)

- 3 specimens of flowering plants from southern Florida. (Given by Mr. C. T.) Simpson.)
- 9 specimens of flowering plants from Alabama. (Given by Dr. R. M. Harper.)
- 50 specimens "Phycotheca Boreali-Americana," Fascicle 46. (Received for Columbia University.)
- 1 specimen of *Chenopodium graveolens* from Mexico. (Given by Mr. M. de Sautreppe.)
- 1 specimen of *Sphagnum* from the Okefenokee Swamp, Georgia. (Given by Dr. R. M. Harper.)
- 1 specimen of "gum resin" from *Dacryodes excelsa*, from Dominica, West Indies. (Given by Mr. W. C. Fishlock.)
- 25 specimens of mosses from Washington. (By exchange with Mr. F. L. Pickett.)
- 1 specimen of moss from Pennsylvania. (By exchange with Mr. Edwin B. Bartram.)
- 3 specimens of mosses from Maine. (By exchange with Miss Annie Lorentz.)
- 1 specimen of moss from Cuba. (By exchange with Brother Leon.)
- 55 specimens of ferns and flowering plants from Central America. (By exchange with Professor W. W. Rowlee.)
- 3 specimens of hepatics from New England. (By exchange with Miss Annie Lorenz.)
- 18 lantern slides of tree surgery. (Given by The Davey Tree Expert Company.)
- 1 specimen of moss from Ohio. (By exchange with C. M. Shipman.)
- 8 specimens of mosses from Japan and Hawaii. (By exchange with Mr. E. B. Chamberlain.)
- 1 specimen of moss from Ontario. (By exchange with Dr. O. E. Jennings.)
- 42 specimens of mosses from California. (By exchange with Miss Alice Eastwood.)
- 2 specimens of mosses from Japan. (By exchange with Dr. V. F. Brotherus.)
- 7 colored lantern slides of orchids. (Purchased from Miss E. M. Kittredge.)
- 30 lantern slides of Ecuador vegetation. (Purchased from Dr. J. N. Rose.)
- 2 specimens of *Quercus Catesbaei Rappii* from Florida. (Given by Mr. Severin Rapp.)
- 1 specimen of *Lupinus subhirsutus* from California. (Given by Dr. Anstruther Davidson.)
- 1 colored lantern slide of *Monotropa uniflora* from Lake Mohonk, New York. (Given by Professor R. S. Barlow.)
- 1 specimen of *Berberis canadensis* from Virginia. (Given by Mr. C. A. Ludwig.)
- 2 specimens of "wooden-flowers" from Central America. (Given by Dr. L. A. Wailes.)
- 18 specimens of mosses from Colorado. (By exchange with Dr. F. E. Lutz.)
- 9 specimens of mosses from Alaska. (By exchange with Mr. C. W. Thornton.)
- 22 specimens of mosses from Wisconsin. (By exchange with Dr. C. F. Mills-paugh.)
- 1 specimen of moss from New Jersey. (By exchange with Miss Northrop.)
- 13 specimens of flowering plants from the White Mountains, New Hampshire. (By exchange with Harvard University.)
- 27 specimens of native fruits. (Given by Dr. H. H. Rusby.)

- 10 specimens of nut meats from Europe. (Given by T. H. Duche & Sons.)
- 36 specimens of cultivated food products. (Given by Dr. H. H. Rusby.)
- 5 specimens of coffee. (Given by Mr. P. L. Johnson.)
- 11 specimens of fodder plants. (Given by Dr. H. H. Rusby.)
- 14 specimens of grapes from Texas. (Given by I. V. Munson & Company.)
- 8 specimens of tanning materials. (Given by Dr. H. H. Rusby.)
- 5 specimens of rubber from Singapore. (Given by Professor F. E. Lloyd.)
- 14 specimens of spices. (Given by Dr. H. H. Rusby.)
- 20 specimens of fungi from Pennsylvania. (By exchange with Mrs. V. W. Delafield.)
- 4 specimens of fungi from the New York Botanical Garden. (Collected by Mr. Felix F. Wilmousky.)
- 1 specimen of *Aster sagittifolius* from New York. (Given by Dr. Anna E. Perkins.)
- 14 specimens of hepticae from Alaska. (By exchange with the United States National Museum.)
- 2 specimens of *Aster* from Princeton, New Jersey. (Given by Professor W. M. Rankin.)
- 1 lantern slide. (Given by The Conrad Slide and Projection Company.)
- 29 specimens of fungi and slime moulds from Pennsylvania. (By exchange with Mrs. V. W. Delafield.)
- 2 specimens of fleshy fungi from Rio Piedras, Porto Rico. (By exchange with Prof. F. S. Earle.)
- 3 specimens of *Phyllosticta* from Wisconsin. (Given by Dr. J. J. Davis.)
- 3 specimens of fungi from New Hampshire. (By exchange with Dr. L. O. Overholts.)
- 20 specimens, "Fungi Wisconsinenses Exsiccati." (Distributed by Dr. J. J. Davis.)
- 2 specimens of fungi from Campe Meade, Maryland. (By exchange with Mr. C. A. Schwarze.)
- 1 specimen of *Sclerotinia Geranii* from New York. (Collected by F. J. Seaver.)
- 8 specimens of fungi from Porto Rico. (By exchange with Professor F. S. Earle.)
- 1 specimen of *Stereum albobadium* from Cuba. (By exchange with Brother Leon.)
- 4 specimens of fungi from South Carolina. (By exchange with Professor G. W. Wilson.)
- 1 specimen of *Melanoleuca phaeopodia* from Toronto, Canada. (By exchange with Professor J. H. Faull.)
- 1 specimen of *Septobasidium cirratum* from the Bahamas. (Collected by Mr. L. J. K. Brace.)
- 1 specimen of *Mycenastrum oregonense* from Utah. (By exchange with Professor A. O. Garrett.)
- 1 specimen of *Sclerotinia smilacina* from Ithaca, New York. (Given by Professor H. H. Whetzel.)
- 17 specimens of native food products and condiments. (Given by Dr. H. H. Rusby.)
- 4 specimens of dyeing materials. (Given by Dr. Samuel Hooker.)

- 5 specimens of cotton. (Given by Dr. E. B. Southwick.)
- 1 specimen of vanilla-bean. (Given by Dodge & Alcott.)
- 34 specimens of economic plants from New York. (Collected by Messrs. Williams and Wilson.)
- 18 specimens, illustrating the manufacture of pyraline. (Given by E. I. du Pont de Nemours & Company.)
- 1 specimen of *Vulgaria globosa* from Ontario. (By exchange with Professor J. H. Faull.)
- 1 specimen of *Trichopeziza sulphurea* from New York. (By exchange with Professor H. H. Whetzel.)
- 26 specimens of flowering plants from New Brunswick. (By exchange with Harvard University.)
- 1 specimen of candle-nut from Porto Rico. (By exchange with ————)
- 26 specimens of flowering plants from Colombia. (By exchange with Dr. M. T. Dawe.)
- 1 specimen of *Ranunculus* from New Jersey. (Given by Miss A. M. Seifert.)
- 11 specimens of *Ochroma* from Central America. (Given by Professor W. W. Rowlee.)
- 235 specimens of flowering plants from Quebec. (By exchange with Brother Victorin.)
- 402 specimens of flowering plants from North America. (By exchange with the United States National Museum.)
- 98 specimens of flowering plants from North America. (By exchange with Harvard University.)
- 212 specimens of flowering plants from Canada. (By exchange with the Geological Survey of Canada.)
- 450 specimens of lichens from southern Florida. (Collected by Dr. and Mrs. N. L. Britton.)
- 1960 specimens of ferns and flowering plants from Florida. (Collected by Dr. J. K. Small.)
- 870 specimens of ferns and flowering plants from southern Florida. (Collected by Dr. N. L. Britton and Dr. J. K. Small.)
- 65 specimens of drugs. (Given by Parke, Davis & Company.)
- 88 specimens of drugs. (Given by Dr. H. H. Rusby.)
- 7 specimens of drugs. (Given by Peek & Velsor.)
- 30 specimens of drugs. (Given by Merck & Company.)
- 3 specimens of drugs. (Given by Seabury & Johnson.)
- 8 specimens medicinal products. (Given by Seabury & Johnson.)
- 7 specimens of native fruits from Ohio. (Given by Dr. J. A. Lloyd.)
- 7 specimens of native fruits from Alabama. (Given by Dr. R. M. Harper.)
- 1 specimen of a native fruit from New Jersey. (Given by Mrs. E. W. Given.)

JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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JOURNAL

OF

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No. 242

OF GROTTOS AND ANCIENT DUNES

A RECORD OF EXPLORATION IN FLORIDA IN DECEMBER 1918

WITH PLATES 241 AND 242

Botanical exploration in Florida in recent years has shown that state to be much more of a cactus center than was formerly supposed. Certain observations in the course of our field-work there during the past decade and the record, over a century and a quarter old, of a large prickly-pear, native in a region still uninhabited, determined the writer of this paper to devote a few days during the early part of December, 1918, to further investigations, as well as to studies in the cactus plantation of Mr. Charles Deering at Buena Vista, Florida. The field-work, carried on mostly in hitherto unvisited parts of the state, and the studies in the garden above referred to made our knowledge appear so complete, that a preliminary interpretation of the genus *Opuntia* as it was then known to occur in Florida was attempted, and the main features were outlined on some earlier pages of the Journal.¹ The extensive field-work described on the following pages was made possible through the interest of Mr. Charles Deering, who has also generously coöperated in previous, as well as in subsequent, field excursions.

NORTHERN FLORIDA

The excursion took us to the western and southern extremes of the mainland, and much new territory in the interior of the

¹ Journal of the New York Botanical Garden 20: 21-30. pl. 224-226. 1919.

peninsula was visited. Our first objective in Florida was Pensacola, which is situated in the extreme western part of the state and is built on the meeting ground of two geographical regions, the western Florida coast region and the western Florida pine hills. It is less than ten miles from Perdido Bay on the Alabama line on the west and the Gulf of Mexico on the south. The surrounding region is superficially, from a geologic standpoint, Pleistocene and recent formations. The flat portion near Pensacola Bay (western Florida coast strip) is backed by rolling hills (western Florida pine hills) which "rise to one hundred and one hundred and fifty feet." The hills adjacent to Pensacola are sparingly forested with a mixture chiefly of the sand-pine and turkey-oak. Of course, the pine trees were in beautiful leafage, and the dead, but bright red leaves of the oak were still persistent on the branches. The other shrubs, were bare, but the buds for the approaching spring were evident and the sand-loving mosses were starting new growth. The season when seeds and plants sprout and grow in the southern coastal plain is usually several months in advance of spring at the North. A shrubby evergreen-goldenrod (*Chrysoma pauciflosculosa*), contrary to its assigned habitat, the littoral belt, was in bloom everywhere on the dry hills north of the town.

On the higher level stretches in place of pine woods, apparently chiefly caused by slight moisture-collecting depressions in the land, were occasional hammocks of beautiful live-oak trees with wide-spreading branches.

Our errand was for cacti and ferns, and we were not wholly disappointed in our search, for we found one prickly-pear (*Opuntia Pollardi*) and one fern (*Pteris aquilina*)!

In the low land along Escambia Bay, an interesting phenomenon was observed. The flats near the shore in some places supported a growth of the live-oak and the magnolia within reach of the tide, as is the case with the hickory on the shore of Apalachicola Bay.¹ The trees seem none the worse for their saline environment.

A few miles east of the Escambia River and Escambia Bay

¹ Journal of the New York Botanical Garden 19: 5. 1918.

lies one of the botanically little-known and very interesting regions of Florida. It is situated between the 85th and 87th meridians. In fact all the state west of the Apalachicola has been neglected from a botanical standpoint. The least known part lies between the 86th and 87th meridians, and within these limits and occupying about one-third of the area is the Choctawhatchee Division of the Florida National Forest. I do not know of a single collector who has explored it, although some observations have been made there, and its vegetation is little known, except for a list of shrubs and trees brought together for a preliminary report on the reservation by agents of the National Forest Service.

This district lies wholly within the western Florida pine hills and comprises three geological formations—from north to south the Oligocene, the Miocene, and the Pleistocene. In altitude and topography it ranges from the flats at sea-level to hills said to be approximately three hundred feet high in the interior.

The most conspicuous trees in the higher parts, as in the Pensacola region, are the pine, in this case the long-leaf-pine, and the turkey-oak. Altogether, ninety-six woody plants, including several naturalized exotics, have been reported for the Choctawhatchee National Forest, of which eight trees are of commercial importance. Nearly all of these, which are for the most part broad-leaved shrubs and trees, grow in the hammocks and swamps bordering or near the several rivers and creeks that flow across the reservation.

In that region we find only sandy soil without exposed rocks. Eastward, however, outcrops of limestone appear. Hardwood forests and short-leaf pine increase until the pinelands of the eastern Florida flatwoods are encountered.

In middle and western Florida we find a mingling of northern and southern floras, the former extending down the hills and ridges of western Georgia into the hilly country of northern Florida, and the latter extending up from the warm Gulf Coast nearby.

The middle portion of northern Florida is a rather extraordinary plant region and one perhaps more interesting, on account

of some of its endemic plants, than either the eastern or the western portions. In it, and also in adjacent parts of Alabama and Georgia, we find an exceptional number of endemic species ranging from inconspicuous herbs to large shrubs and trees. The herbaceous plants are too numerous to mention in a paper of this scope. The two noteworthy trees of this category are the yew (*Taxus floridana*) and the torreya, more commonly known locally as stinking cedar, (*Tumion taxifolium*) neither of which have arboreous relatives in the New World nearer than California.

Working by day and traveling by night soon brought us to the northern part of the Florida peninsula at Gainesville. There we stopped long enough to examine in the State University grounds the plantation of *Zamia* made from plants collected a year previous about twelve miles west of Gainesville.¹ These plants had been set out adjacent to a similar plantation of *Zamia floridana* brought several years before from the Miami region or the Everglade Keys. As far as the newly planted specimens had grown they appeared almost identical with those from the southern end of the peninsula. Now the interesting question arises: How can we account for the northern outlying stations of this *Zamia*? Do they represent the remains of a formerly more extensive geographic range or do they represent an extension of range in reasonably recent time? That is, did the plants come there through natural modes of seed-dispersal or were they introduced by means of plants brought from further south in the peninsula by the aborigines of Florida, or by the Seminole Indians who formerly, like the aborigines, as well as lately, used the caudex as a source of starch. Further field-work, which the writer hopes some day to carry on, may perhaps determine these points. Thus, scores of interesting problems arise, some of which can be solved only by extended investigations in the field.

LAKE GEORGE REGION

From Gainesville we went south to Ocala. Both these places are situated in or near the lime-sink region, which, too, is in need

¹ Journal of the New York Botanical Garden 19: 74. 1918.



The "scrub" in the Ocala Division of the Florida National Forest, west of Lake George, December, 1918. Fruiting plant of the scrub-palmetto (*Sabal Elonia*) growing in the snow-white sand. This palm is mostly confined to the "scrub." It was named for the Etonia "Scrubby" which lies a few miles south of the Lake George region. The cabbage (bud) of this palm is collected and eaten like that of the cabbage-tree (*Sabal Palmetto*)

of botanical exploration, but the very limited time at our disposal prevented us from making even a beginning, as we had gone to Ocala merely to gain entrance to the Lake George country which lies to the eastward.

The lime-sink region is characterized by rolling sandy hills clothed with pine trees, circular or irregular sinks, few streams and often large boiling springs in the lower levels or near the streams. The boiling springs, some shallow, others very deep, are often the direct sources of streams that are feeders of Ocklawaha River or the Saint John's River. All this is very enticing to the collector and also exasperating to him when he traverses the region and is unable to devote time to an investigation of it. At Ocala we procured a motor-car and proceeded directly to the lake region, calling at the headquarters, east of Lynn, of the Ocala Division of the Florida National Forest, where Mr. C. H. Rogers, forester-in-charge, joined us and spent the day with us driving over the reservation.

As the purpose of our journey was to find prickly-pears near Lake George, we took the nearly straight and very narrow trail directly to Juniper Springs and soon found ourselves in a region that had not been botanically investigated for nearly a century and a half. A large part of the territory east of the Ocklawaha River and west of the Saint John's consists of the so-called "scrub." It is a series of ancient and now stationary sand-dunes. The sand is fine-grained and usually snow-white. Woody vegetation is conspicuous and plentiful, although stunted; herbaceous vegetation is rather inconspicuous and scattered, never massed.

A score of shrubs are evergreen; most conspicuous among them is the rosemary (*Ceratiola*). It grows as a broom-like bush from three to eight feet tall, has very numerous, but also very small, reddish or yellowish flowers in fall and winter and, later, small globular fruits clustered along the branches. However, neither flowers nor fruits are conspicuous; but the deep-green of the myriads of crowded leaves stands out very conspicuously against the white sand. This plant is widely separated from its two relatives in the United States—the crowberries (*Empetrum*

and *Corema*)—both of which are mainly boreal in their distribution.

The prickly-pear of the region was soon found growing all over the sand-ridges, many of the plants bearing both flowers and fruits. The scrub-palmetto was plentiful and in the height of its fruiting season.

These sand-ridges constitute the northern portion of the "scrub." Thence it extends nearly directly southward perhaps somewhat interruptedly for one hundred and fifty miles in about the middle of the peninsula, with branches and outlying areas extending towards and to both the Gulf and Atlantic coasts and to about fifty miles from the southern end of the peninsula.

East of the "scrub" are extensive prairies, pine woods, hammocks, and shell mounds, and less in area, but not least interesting, lime-sinks. It is withal a strange country and it might be, by some, considered uncanny or even dangerous. The land is liable to cave in beneath one's feet and drop one in the bottom of a shallow pit or, if the distance should be sufficient, submerge one below the water-table. There are sinks on record, between Ocala and the Saint John's River, that have carried the forest trees down over fifty feet, and where the trunks may still be seen submerged in the clear water. We found sinks of various sizes and shapes, some with boiling springs which spread out into lake-like expanses, others with small trickling springs whose waters seeped away in the bottom of the sink. The more well-like sinks often formed beautiful fern grottoes.

This land, with its extensive prairies, its lakes, forests, and springs, was evidently a favorite locality with the aborigines, as is evidenced by the shell mounds in the vicinity of Lake George. We finally reached the western shores of Lake George and perhaps stood on the very spot where the Bartrams¹ camped during their travels in that region about a century and a half ago.

¹ John Bartram (1699-1777), the first native American botanist, was greatly encouraged in his work as a collector of seeds and living plants by correspondence with Peter Collinson (1694-1768), of London, who eventually secured him an appointment as "King's botanist." Bartram traveled and collected from New York to Florida. In the summer of 1765, at the age of 66, he explored the Saint John's nearly throughout its length, and several of its tributary streams.

The prickly-pear that occurred scattered in the "scrub" grew in large colonies on the level shore or kind of flood-plain of the lake between the forested edge of the water and the hammock on the higher ground in the rear.

Thence we began a circuitous route through the more northern parts of the reservation. It was there we found the prickly-pear in its greatest development.¹ This species, using the term in a horticultural way, might be called the standard prickly-pear. When fully developed it grows to a height of six to eight feet, with a single stem, often over six inches thick, and a widely branched crown.

The first botanical record of *Opuntia* in Florida appears to be an account of a plant from the Lake George region by William Bartram in his "Travels"² in 1791. We had hoped to rediscover, and identify the Bartram plant, but the one we found, although agreeing with Bartram's description in size, differs fundamentally from the description in the armament and the fruits. The Bartram plant remains to be rediscovered, unless it has been exterminated by the half-wild cattle that have roamed that country for a century or two. The cattle even now browse on the joints of the plant we found there, in spite of its copious armament of spines.

Both the Florida species of *Zamia* grew in that region—*Zamia floridana* in the pinewoods and *Zamia pumila* in the hammocks and sink-holes. Doubtless both these species were observed by the early travelers in these parts of Florida; but they evidently did not then distinguish them as different kinds. Indeed, it was not until the end of the last century that the differences between the species were clearly interpreted and it

William Bartram (1739-1823) had the advantage of a better education, and of association with his father's scientific work from childhood. He accompanied his father to Florida in 1765, insisted upon remaining there, and settled as a planter on the Saint John's River, where he stayed about two years. In 1772 he began the extensive journey in the Carolinas, Georgia, and Florida, reported in his published "Travels." He was a botanical artist of much enthusiasm and considerable ability.—JOHN HENDLEY BARNHART.

¹ See notes published in *Journal of the New York Botanical Garden* 20: 21, 29, and 30. *pl.* 224. 1919.

² *Travels through North and South Carolina, Georgia, East and West Florida*, 161.

was only quite recently that their geographic distribution was reasonably well understood.

William Baldwin,¹ writing from a settlement called Tomoko, Florida, on May 15, 1817, to a friend at the North, says: ". . . I had the gratification to find the 'wild sago,' or coontia, of the Seminoles. . . . Bow-legs, the grandson of Bartram's 'Long Warrior,' says, that 'Coontia' signifies bread plant. . . . At supper, I had the pleasure to eat the bread prepared from the large tuberous root of this plant. In the late times of difficulty many negroes, and others, were prevented from perishing with hunger by having recourse to it." The coontie or comptie, as it is now called, is still used by the Seminole Indians, and there are starch mills that have furnished the flour to manufacturers in commercial quantities for many years.

Having returned to Ocala late in the evening, we started at once for Miami by way of Jacksonville, and, in due time, reached our destination.

A JOURNEY TO THE FERN GROTTES

No sooner had we arrived at Miami than we set out on another excursion to the upper part of the peninsula nearly as far north as the Lake George region which we had left only a day or two previously. In the five days at our disposal we covered an itinerary of about nine hundred miles. Our most distant objective was Lake Tsala Apopka in Citrus County. Leaving Miami in the forenoon, in a motor car driven by John DeWinkeler, my associate in exploration, we reached Titusville in the evening, passing through the same region described in a former paper.² Traveling still further north, the next morning we reached New Smyrna in time to partake of a breakfast, and then started across the peninsula. After passing through the flat woods with their forests of long-leaf pines and sand-pine in the higher

¹ William Baldwin (1779-1819), a medical graduate of the University of Pennsylvania and a surgeon in the United States navy, was an enthusiastic student of the flora of the southern states. In 1805-06 he visited China, and in 1817-18, South America, but more than half of the last decade of his short life was spent in Georgia and neighboring states.—JOHN HENDLEY BARNHART.

² Journal of the New York Botanical Garden 20: 191-207. 1919.



Western Shore of Lake George, about midway north and south, December, 1918. This body of water, about fifteen miles long and eight miles wide is part of the St. Johns River. The hammock in the background was evidently a camping place of the Florida aborigines, and doubtless also of the Seminoles. There, too, the Bartrams may have camped during their exploring excursions up and down the St. Johns. Notice the shadow of a passing cloud in the foreground

parts, and the black-pine in the low parts, and all interrupted with streams and hammocks, we came to the lake region. We first stopped at Sanford where we called on the local botanist, Severin Rapp¹ who is well known through his widely distributed collections of mosses, hepatics, and lichens. Thence we passed on to Winter Park, where we met Mary Francis Baker² (Mrs. Thomas R. Baker), who is now specializing on the local flora and on plant photography. Our last stop in the lake region was at Orlando where we called on Cameron Mann,³ Episcopal Bishop of Southern Florida, and also a botanist. Dr. Mann's residence is surrounded by trees and shrubs planted many years ago. The two more conspicuous specimens are a giant camphor tree and a very large *Pterospermum*. The latter-named tree was frozen to the ground two years ago; but today it is over thirty feet tall. At Orlando we obtained final instructions for reaching our immediate objective—Inverness, which is situated on the western coast of the peninsula.

We had good roads for many miles west of Orlando, but they began to fail us about sundown, and it was dark when we reached Bushnell. There we partook of our first regular meal since leaving Miami, and then set out for Inverness. As the uncertainty of the road was intensified by the darkness of a cloudy night, we took the precaution of asking a half dozen individuals the nearest way to Istachatta, where we expected to turn

¹ Severin Rapp was born in Schramberg, Württemberg, September 6, 1853; came to America in 1883, and in the following year settled at Sanford, Florida, where he still resides; was a shoemaker until his retirement in 1911; became interested in botany about 1907, and has become well known as a plant collector, in recent years devoting his attention particularly to cryptogams, several of which bear his name.—JOHN HENDLEY BARNHART.

² Mary Evans Francis was born at Plainfield, Connecticut, November 29, 1876, and made her home there until 1917, when she removed to Florida; in 1918 she married Thomas Rakestraw Baker, Ph. D. (1837-), of Winter Park, who was for many years a college professor of natural science in Pennsylvania and Florida. Mrs. Baker is the author of a "Book of Grasses," published in 1912.—JOHN HENDLEY BARNHART.

³ Cameron Mann was born in New York City, April 3, 1851; is a graduate of Hobart College and the General Theological Seminary, and has received the degree of S. T. D. from both institutions; has been an Episcopalian clergyman since 1873, and bishop since 1901. He has been Bishop of Southern Florida, with his episcopal residence at Orlando, since October, 1913.—JOHN HENDLEY BARNHART.

north to reach our destination. We received definite and non-contradictory information, the gist of which was without exception, to take the left hand road at each fork, which was definitely identifiable in some way. All went well and all localities tallied with our information, strange to say, until we passed near the site of Dade's massacre. Here during the Seminole War only a single man of the entire command, and a wounded one at that, escaped. This seems to be an unlucky spot, for here we came upon a stream and a bridge, and also a fork in the road on the western side, all of which had been left out of our instructions. As it happened, this was the only fork where we should have taken the right hand road instead of the left. After we had gone several miles into the sand-hills we realized that we were on the wrong trail, as the road continued to bear off too far to the southwest. The geological formation had changed at about the point where we took the wrong trail. The country now became quite hilly and more sandy, and was apparently uninhabited. Although we realized our mistake, we decided to continue and await developments. Finally we reached the Withlacoochee River, crossed it and found ourselves at Croom about half way up the road to Inverness, this without having been arrested by the county officials, although, perhaps, under suspicion as blockade runners as illegal transporters of spirituous liquor are known in those parts.

Early the following morning we retraced our course of the previous night as far as Pineola, where we left the main road and turned east into the pine woods toward the Withlacoochee River about a mile distant. After a slight drop in altitude we came upon a natural flower garden. Although it was nearly mid-December, horse-mint (*Monarda*), yellow-jessamine (*Gelsemium*), yellow-buttons (*Actinosperrum*), goldenrod (*Solidago*), and several asters (*Aster*) were in full bloom. After another slight decline, we found ourselves on the edge of a veritable natural amphitheatre, surrounding a cypress swamp. On entering the theatre through the rocky walls we found ourselves among boulders, chasms, cañons, natural bridges, and caves of eroded limestone. Everything was partly or completely covered with

a growth of at least a dozen different kinds of ferns, which varied from the delicate lace-like kinds to rather coarse ones. An enchanting grove of both coniferous and broad-leaved trees overshadowed the grotto, altogether a grove and a grotto that would have been a delight to the devotees of the worship of Baal; but this sanctuary had already been profaned.

The trees of the hammock association are mainly deciduous. Most common among them are iron-wood (*Carpinus*), oak (*Quercus*), elm (*Ulmus*), sugarberry (*Celtis*), mulberry (*Morus*), red-gum (*Liquidambar*), ash-leaved maple (*Negundo*), and dog-wood (*Cynoxylon*). Among the larger trees the live-oak (*Quercus virginiana*), a fruit-bearer, is evergreen, as the common name indicates, the other, the bald-cypress (*Taxodium distichum*), a cone-bearer, is deciduous-leaved. These two trees are the giants. The cypress predominates in the swampy parts, growing with clean, stout shafts rising high above the variously buttressed bases. Gigantic "knees" were present, apparently larger in the more rocky places where these stout concrete-like cones sometimes rise higher than one's head. The giant of the higher rocky places is the live-oak, standing directly on large rocks with monument-like shafts sometimes clear of branches for over fifty feet. One tree we measured had a trunk diameter of nearly six feet eight inches about four feet above the ground!

Conspicuous at that season, and ubiquitous, were two members of the nettle family and the mallow family. The former (*Urtica chamaedryoides*) had numerous inconspicuous flowers, while the latter (*Pavonia spinifex*) bore fewer but larger and showy yellow flowers. Both these plants are armed; but for different purposes, the nettle with stinging hairs for defence and the mallow with fang-like carpels with barbed awns for dissemination. No plants within the grotto are like those in the surrounding pinewoods, even the palms are different. The common saw-palmetto (*Serenoa*) inhabits the pine woods; while the palm of the grottoes is the rarer needle-palm (*Rhaphidophyllum*).¹

The fern history² of this and neighboring grottoes dates from

¹ See Journal of the New York Botanical Garden 19: 69-77. 1918.

² For a detailed account of the history of these ferneries see R. M. Harper, American Fern Journal 5: 68-81. 1916.

1881, when A. H. Curtiss,¹ having learned of their existence in some way not recorded, made a pilgrimage to them from Gainesville. Two years later John Donnell Smith² went to the same region and found some kinds of ferns that were not represented in the Curtiss collection. Nearly a decade elapsed before the grottoes were again visited. Since that time, however, a number of fern students and plant collectors had been there.

Up to the time of our visit the total number of ferns discovered in this grotto was twelve. We found all the species previously reported and two additional ones which are indicated by small capital letters in the following list. They are:

POLYPODIUM PECTINATUM	<i>Asplenium heterochroum</i>
<i>Polypodium polypodioides</i>	ASPLENium PLATYNEURON
<i>Polypodium Plumula</i>	<i>Asplenium verecundum</i>
<i>Pteris cretica</i>	<i>Tectaria heraclifolia</i>
<i>Adiantum tenerum</i>	<i>Dryopteris floridana</i>
<i>Asplenium abscissum</i>	<i>Dryopteris normalis</i>
<i>Asplenium Curtissii</i>	<i>Dryopteris reptans</i>

Such a concentrated growth of ferns we have never seen anywhere else. Boulders and cliffs were entirely hidden from view by dense masses of the various species growing intimately mixed. On other overhanging rocks with rather smooth faces

¹ Allen Hiram Curtiss (1845-1907) was a native of Oswego County, New York. In his youth the family removed to Virginia, and it was in this state that he began to collect plants for distribution. In 1875 he settled in Florida, where he lived for the remainder of his life. For many years he was a professional collector, always gathering if possible a considerable supply of each plant, and his specimens, with printed labels, are to be found in nearly all the large herbaria of the world. He was the discoverer of many of the plants of southern Florida. During the last five years of his life he extended his activities to parts of the West Indies.—JOHN HENDLEY BARNHART.

² John Donnell Smith was born June 5, 1829, in Baltimore, Maryland, which has always been his home. After graduation at Yale, he studied law, and was admitted to the bar. During the latter part of the Civil War he was a captain in the Confederate Army. For many years he has devoted much of his time to the study of the flora of Central America, and through his persistent efforts thousands of specimens illustrative of this flora, including many collected by himself during the years 1889-96, have found their way into various important herbaria. He collected in peninsular Florida repeatedly in 1877 and following years; as early as 1878 he explored the Caloosahatchee in company with the bryologist Coe Finch Austin (1831-1880).—JOHN HENDLEY BARNHART.

the plants were scattered. Most of the kinds grow not only on the perpendicular faces of the rocks, but also on the top of boulders and all more or less horizontal surfaces. The masses of leaves of various sizes and kinds of ferns often completely hide numerous pitfalls of various sizes and ranging from a few feet to twelve feet deep. Walking is rendered exceedingly dangerous from these pitfalls alone, not to mention the soft and crumbling edges of cliffs and ledges.

The resurrection-fern (*Pclypodium polypodioides*) was the only truly epiphytic fern. The two wood-ferns (*Dryopteris floridana* and *D. normalis*) often grow in colonies; while the walking-fern (*Dryopteris replans*) and the other kinds mentioned above occur thoroughly intermixed. One can often grasp a half dozen different kinds with one hand!

After nature has built and adorned this grotto beyond the power of words to describe, man has recently started the task of utterly destroying it. Although limestone rock is thereabouts in unlimited supply, a mill¹ placed at the edge of the grotto is grinding the limestone into powder to be sold for the purpose of liming cultivated fields!

After we had looked over the larger part of this great amphitheatre we returned to Pineola and located a series of caves further north between the road and the river. There we found less surface weathering and more subterranean erosion. Quite extensive caves enabled us to walk about some ten to fifteen feet beneath the surface of the ground. Only near the openings of the caverns did we find ferns and then in less abundance both as regard to kinds and quantity than at the first-visited locality. There, in the bottom of one of the larger pits, two very interesting herbaceous flowering plants covered nearly all the rocks: the one, a peculiar grass (*Pharus latifolia*), had greatly elongate fibrous roots, broad leaves, not suggestive of a grass, and more peculiarly large panicles of fruits. The fruits are viscid and fugaceous, and after one has handled a plant he finds most of the fruit adhering to his clothing. This grass was only once previously collected in Florida, nearly a century ago during the

¹ See also R. M. Harper, Natural History 19: 201. 1919.

Indian Wars. The mature plants in leafage resemble some kinds of seedling palms. The other plant was a *Peperomia*, of a species first collected in eastern Florida in the early part of the last century and brought to light only a few times since. It is the only one of our four species of *Peperomia* now found in Florida that does not also grow in the West Indies.

Toward sunset we left the fern-grottoes and started for Brooksville. En route, shortly after leaving Floral City, we passed over some sand hills with a north and south axis. After crossing another range of hills toward the west, we turned south, and, soon running into a heavy rain-storm that lasted with more or less severity for about twenty-four hours, we reached Brooksville with our outfit pretty well soaked. Although it was dark, we continued through the town and called at the Plant Introduction Garden of the United States Department of Agriculture, a few miles southeast of the city limits.

(To be continued.)

THE WILD PIMENTO OF JAMAICA

The region known as Peckham Woods in Upper Clarendon Parish, Jamaica, has yielded many plants new to science through the collections made there by Mr. William Harris, Government Botanist and Superintendent of Public Gardens. Among these novelties perhaps the most interesting is the tree there known as "Wild Pimento," and which grows on limestone rocks. As the name implies, it is a relative of Pimenta or Allspice, *Pimenta Pimenta* (L.) Cockerell, widely distributed in Jamaica, although it is more closely related to the tree which yields oil of bay, the bay tree or bay rum tree of Porto Rico and the Lesser Antilles, *Amomis caryophyllata* (Jacq.) Krug & Urban. Like this it has 5-parted flowers, while those of *Pimenta* are 4-parted; its foliage and fruit are also more like those of *Amomis*, while the volatile oil which pervades the plant is different from that of either

relative. *Amomis caryophyllata* runs into a number of slightly different races in its long range through the islands from Porto Rico to Tortola and Trinidad, but none of them known to us approach very closely the Jamaica tree here discussed.

***Amomis jamaicensis* Britton & Harris, sp. nov.**

A tree up to 13 m. high, with a trunk sometimes 3 dm. in diameter, glabrous throughout, the twigs terete, rather stout. Leaves elliptic or obovate-elliptic, thick-coriaceous, 5-9 cm. long, dull, nearly equally green on both sides, pinnately veined, not strongly reticulate, rounded at the apex, narrowed, obtuse or rounded at the base, the midvein impressed above, elevated beneath, the stout petioles 1.5 cm. long or less; inflorescence several-many-flowered, 5-8 cm. broad, its branches stout, fruits sessile or nearly so, ellipsoid, 8-10 mm. long, the 5 small sepals persistent on the ripening ovary; seeds 2; radicles much longer than the cotyledons.

Peckham Woods, Upper Clarendon, Jamaica (*Harris 12876, type; 12788*).

N. L. BRITTON

ORGANIZATION OF THE AMERICAN IRIS SOCIETY

The steadily increasing interest throughout the country in the cultivation and breeding of *Iris* resulted in the organization of The American Iris Society at the New York Botanical Garden January 29, 1920. A desire for such a society had frequently been expressed in the past, and definite suggestions appeared in The Garden Magazine late in 1919. Mr. John C. Wister, of Germantown, Pa., had already formulated tentative plans for organization before he joined the military service, and after his return in 1919 he began active preparations. In these he was aided by several iris specialists throughout the country and was also given material assistance by the officers of the New York Botanical Garden.

Sixty-four persons appeared at the initial meeting, in spite of

many discouraging circumstances, and letters from others at greater distances increased the list of charter members to over 150, representing all parts of the country from Maine to California. Mr. James Boyd, of Philadelphia, presided at the meeting, which was held in the Mansion. Luncheon was served at one o'clock, and by the close of the afternoon session the society was well organized and ready to begin active work. The officers are John C. Wister, president; Robert S. Sturtevant, Wellesley Farms, Mass., secretary, and Frank M. Presby, Montclair, N. J., treasurer. The next meeting of the society will be held during the iris season, probably at Philadelphia.

The plans for the new society include research into the history of iris breeding and the parentage of the numerous horticultural varieties, the standardization of iris descriptions, the registration of iris varieties, with the elimination of duplicate names, investigation of iris pests and diseases, the promotion of general interest in iris cultivation, and the establishment in suitable cities of test and exhibition gardens. In the latter connection the proposed development of an extensive iris collection at the New York Botanical Garden is of especial interest.

Few plants offer such a reward to the gardener or such interesting possibilities to the experimenter as iris. Few plants are as easily cultivated or adapted to as wide a range of soil and climate. The enthusiastic organization meeting and the large membership list indicate at once the widespread interest in the plant, and the society will undoubtedly do for iris what similar societies have already accomplished for the rose, the peony, the gladiolus, and the dahlia.

H. A. GLEASON

CONFERENCE NOTES FOR JANUARY

The January conference of the Scientific Staff and Registered Students of the Garden was held in the laboratory of the museum building, Wednesday, January 7, 1920, at 3:30 P.M. The program for this conference was as follows: "Some sidelights on the so-called 'International Rules of Nomenclature'" by Dr. J. H. Barnhart.

Dr. Barnhart referred briefly to the early rules for nomenclature formulated by Linnaeus, Rafinesque, and other writers; to the long series of international botanical congresses, beginning with that at Amsterdam in 1865, and closing with the "first," "second," and "third" of the numbered series, at Paris in 1900, Vienna in 1905, and Brussels in 1910; and to the codes of nomenclature adopted at Paris in 1867 and at Vienna in 1905. He dwelt in more detail upon the organization of the Vienna congress; the fact that the German delegates voted as a unit, accepting Engler's word as law, and controlled absolutely every vote, first securing the adoption of an innocent-looking set of rules of order which provided for the decision of every question by a mere majority vote; and the further fact that a number of important questions were actually so decided, the decisions thus carrying little weight with anyone familiar with the methods pursued by the congress. He mentioned the peculiar continental conservatism manifested by the congress at Brussels; the prevalent sentiment that a question once decided at one of the series of congresses was settled for all time, and not subject to reconsideration at a subsequent congress; and the consequent failure of the Brussels congress to review any of the acts of the Vienna congress, in spite of the fact that there were nearly as many delegates (79 vs. 89) and votes (191 vs. 212), that more nations were represented, and that there was a much more even distribution of the voting power. In conclusion he called attention to the fact that although these meetings have long been called "congresses," the word "conference" would better express, in English, their true function; delegates attend them to present adequately the views of their constituents, and by their votes to

place those views on record; for his own part he had never considered himself in any way "bound" by the acts of these "congresses" because of his participation in them, and he believed that this was the view adopted by most if not all of the other delegates.

A. B. STOUT,

Secretary of the Conference

NOTES, NEWS AND COMMENT

D. N. L. Britton, Mrs. Britton, and Miss Dorothy Coker sailed February 16 for Port of Spain, Trinidad, where they will spend two months in the botanical exploration of the island. Besides a collection of herbarium specimens, Dr. Britton hopes to secure specimens of living orchids for cultivation in the new orchids greenhouse, recently completed at Conservatory Range 2.

The following visiting scientists have recently registered in the library: Dr. Roland M. Harper, College Point, N. Y., Professor K. M. Wiegand, Ithaca, N. Y., Professor Alexander W. Evans, New Haven, Conn., Mr. Miles de Wachenfelt, Stockholm, Sweden, Miss C. C. Haynes, Highlands, N. J., Prof. G. M. Smith, Madison, Wis., Dr. A. F. Blakeslee, Cold Spring Harbor, and Dr. J. N. Rose, Washington, D. C.

Dr. H. S. Jackson, of the Purdue University Agricultural Experiment Station, spent a week at the garden recently studying the literature of the Uredineae.

Dr. W. T. Swingle, of the Bureau of Plant Industry at Washington, was a recent visitor at the Garden.

Special instruction in practical gardening has been given during the winter months to a class of women. The class has been under the supervision of Mr. K. R. Boynton, supervisor of garden instruction, and Mr. Walter Balch, and has included various phases of plant propagation, pruning, and greenhouse and garden practice.

Work is steadily progressing on the construction of new concrete benches in the greenhouses. The benches are of the same design as those previously installed in Range 1 and are a great improvement over the old benches of wood or slate and steel originally used.

On January 22, the biology pupils of Evander Childs High School paid their semi-annual visit to the Garden, inspecting the conservatory and museum collections under the guidance of their own teachers and members of the Garden staff, and attending a lecture on the subject of forestry given in the museum lecture hall by Mr. George E. Hewitt with slides loaned by the American Museum of Natural History.

The Nature-Study and Garden organizations of the City, about thirty in number, were represented at a meeting held on January 9 at 500 Park Avenue to take preliminary steps toward the publication of a "Guide to Nature-Study and Garden Opportunities in the Greater City." Mr. Van Eyrie Kilpatrick was elected Editor-in-Chief and he is to have an Editorial Advisory Committee made up of one representative from each organization. The cost of publication will be borne by the School Garden Association.

Meteorology for December.—The total precipitation for the month was 2.79 inches of which 0.80 inches (8 inches snow measurement) fell as snow. The maximum temperatures recorded at the Garden for each week were 49° on the 7th, 59° on the 15th, 34° on the 20th, and 49° on the 23d. The minimum temperatures were 13° on the 4th, 17° on the 15th, -4° on the 18th, and 12° on the 26th.

Meteorology for the year 1919.—The total precipitation at the New York Botanical Garden for the year was 37.82 inches. This was distributed by months as follows: January, 3.21 inches (including a very light fall of snow, about ½ inch by snow measurement); February, 2.80 (including 1 and ¼ inch by snow measurement); March, 4.15 (including 4½ inches snow measure-

ment) April, 2.80; May, 4.05; June, 1.14; July, 4.44; August, 4.13; September, 2.85; October, 2.65; November, 2.81; December 2.79 (including 8 inches snow measurement).

The maximum temperature for the year was 100° on the 4th and 5th of July. The minimum was -4° on December 18th. The first hard killing frost of the autumn was on the morning of November 10th.

ACCESSIONS

20 specimens of *Calostoma lutescens* from Pennsylvania. (By exchange with Professor J. F. Adams.)

15 specimens of fungi from Buck Hill Falls, Pennsylvania. (By exchange with Mrs. John Ross Delafield.)

2 specimens of fungi from Ontario. (By exchange with Professor John Dearness.)

1 specimen of *Coltricia tomentosa* from New York. (By exchange with Dr. Howard J. Banker.)

1 specimen of *Clitocybe multiceps* from Canada. (By exchange with Professor J. H. Faull.)

2 specimens of fungi from New York Botanical Garden. (By exchange with Mr. F. F. von Wilmowsky.)

1 specimen of *Anthurus borealis* from New York Botanical Garden. (Collected by Mr. Kenneth Boynton.)

12 specimens of fungi from New York. (Collected by Dr. W. A. Murrill and Mr. H. I. Miller.)

1 specimen of *Bjerkandera fumosa* from Amherst, Massachusetts. (By exchange with Professor P. J. Anderson.)

1 specimen of *Pleurotus ostreatus* from Salt Lake City, Utah. (By exchange with Mr. A. O. Garrett.)

1 specimen of *Ganoderma sulcatum* from South Carolina. (Collected by Dr. F. W. Pennell.)

1 specimen of *Coprinus micaceus* from Utah. (By exchange with Mr. A. O. Garrett.)

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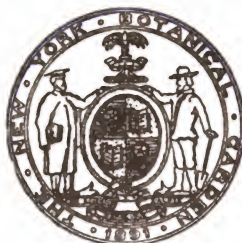
OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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In low part of fern grotto near Pineola, Florida, December, 1918. Lower elevations are characterized by the presence of larger, often gigantic cypress trees with their accompanying "knees" in the foreground. Broad leaved trees are absent or in the minority. In the background is an irregular mass of limestone, evidently much broader than that which has been eroded away from around it. On this rock a dozen different kinds of ferns grow closely crowded together

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OF GROTTOS AND ANCIENT DUNES

WITH PLATES 243 AND 244

(Continued)

Early in the morning we decided to make Arcadia, in latitude over one hundred miles south, our objective for that day. The distance covered was close to two hundred miles, as the road zigzagged most of the way and led us through six different counties. Brooksville is situated on an elevation between the Annuttalagga Hammock in the north and the Choocochatte Hammock in the south. The growth of the latter hammock consists mostly of oak, hickory, red-gum, holly, maple, and numerous smaller trees and shrubs. The wood-fern (*Dryopteris*) was abundant on the ground, while the resurrection-fern (*Polypodium*) inhabited many of the rough-barked tree trunks. After passing by the hammock we began to climb hills. We were then on the western side of the southern extension of the series of hills already mentioned. These ridges seem out of place in peninsular Florida. In crossing them one can look from the top of one ridge across a valley to another ridge and imagine he is looking on some of the ranges of the Appalachian mountain system, although the hills are only slightly over 200 feet high, or perhaps less.

After we had crossed the eastern ridges, the country became slightly undulating, and as we proceeded southward it became

more and more flat. Upon reaching Dade City we turned southward en route to Plant City. About midway between these points we stopped long enough at an enticing spot along the Itchepuckesassa River to collect from the abundance of mosses and hepatics, fresh and conspicuous on account of the rain, that clothed the tree-trunks and old stumps in the river-swamp.

In going eastward from Plant City, before turning southward again, we came to the edge of the lake region which we had left behind about midway between Orlando and Inverness. At Bartow we turned southward and soon entered the South Florida flatwoods and prairie region. Instead of a lake region we had entered a creek and river region. There arise Alafia River, Little Manatee River, Manatee River and Myakka River, most of whose drainage basins slope westward. The longest stream and the one with the largest drainage basin is Pease River or Peace Creek. Creek and river are used more or less interchangeably in that region. Among the named feeders or tributaries of Pease River, which rises in the edge of the lake region, are Saddle Creek, Bowlegs Creek, Whidden Creek, Little Paines Creek, Big Paines Creek, Little Charlie Apopka Creek, Charlie Apopka Creek, Joshua Creek, Chilloocahatchee River, and Prairie Creek, and their tributaries, as well as numerous unmapped and unnamed streams.

At Bartow we entered the drainage basin of Pease River and followed it down as far as Arcadia. In the upper part were vast truck farms somewhat similar to those of the St. John's bottoms near Sanford. Often hundreds of acres, as far as the eye could see, were planted with a single kind of vegetable, particularly cabbage. The numerous hammocks along the way offered tempting collecting places. Plants with white, yellow, and blue or purple flowers were in abundance, although it was winter, but the short twilight and following darkness soon put a stop to collecting.

Darkness, moreover, came on before we were one third of the way down the river valley. We passed Fort Meade just after dark. Somewhere near there is the only locality in the United States where a peculiar fern of tropical America, *Dryopteris*

panamensis. has been found. It was discovered there in 1881 and has not been collected since.

As the twilight passed, the drizzle of the day turned into a heavy rain, which continued until we drove into Arcadia.

While walking about the town that evening and early the following morning we found the common cultivated bird-pepper (*Capsicum frutescens*) and an acanthus-relative (*Strobilanthus isophyllus*), both naturalized about the vacant lots and on roadsides.

Leaving Arcadia as soon as we could get breakfast, we decided on Miami as our next objective. Miami is distant from Arcadia over one hundred and forty miles in a direct line; but fully twice that distance by the shortest route. By putting in a full day's work—twenty four hours—stopping only a half hour for a little subsistence and devoting only short periods to collecting and photographing, we made our schedule almost to the minute.

We retraced our course of the preceding evening as far as the crossing of Pease River, passing through open pine woods and prairies, with some hammocks along streams and in low places. In the pinelands and on the prairies the saw-palmetto was blooming and often filled the air with the fragrance of its myriads of blossoms.

Leaving Pease River to the westward at Wauchula, we headed for the settlement of Avon Park. The earlier part of the route lay through low flat woods with pitcher-plants, milk-worts, ludwigias, and bladderworts in abundance. The pitcher-plant (*Sarracenia minor*) was the most interesting discovery, as no kind of *Sarracenia* had previously been found south of Kissimmee. It was most abundant in the low pinelands a few miles east of Wauchula and Zolfo Springs. As we approached the headwaters of Charlie Apopka Creek, which occupy a slough midway between Pease River and a chain of lakes eastward, hammocks came into view and we passed through extensive areas of hardwood growth and still more extensive areas of wrecked hammocks. In these the skeletons of thousands of large live-oak trees stood out as so many fantastic ghosts, and, instead of being surrounded with their normal associates of herbaceous and shrubby growth, had nothing but coarse weeds about them.

Eastward of Charlie Apopka Creek, we again approached the lake region, meeting first a prairie-like condition of the "scrub." There the prickly-pear (*Opuntia ammophila*), previously found near Lake George, appeared in abundance, but in stunted form, usually not over four feet tall, but true in all its characters. As we neared the chain of lakes of which Lake Istokpoga and several satellites form the southern outpost, the "scrub" began to appear as elevations that almost simulated active dunes. From Avon Park south to Sebring the rolling dunes of snowy sand with lakes and lakelets in their depressions were veritable winter flower gardens. These flowers held sway just as did the ferns at Inverness. The *Garberia* which we met with in the "scrub" west of Lake George during the previous week, reappeared. This composite shrub, endemic in peninsular Florida, is said to be exceptionally handsome when in flower. It is conspicuous all winter when in fruit on account of the very numerous tufts of brown pappus persistent in the involucre. The "scrub" prickly-pear was there with its purple fruits. The most conspicuous plant in bloom was a member of the knotweed family, *Thysanella robusta*. This seems to be primarily a winter bloomer. Individual plants form clumps mostly two to four feet in diameter, each with numerous feathery plumes of myriads of white flowers.

In addition to the *Thysanella*, other mat-like plants or ground-covers were in abundance in places reasonably free from fire, two of these being particularly conspicuous. One, a relative of our common carpet-weed, *Anychiastrum herniarioides*, formed closely depressed¹ mats completely covering the sand, but fragile at maturity and acting as a tumble-weed when dead. Rather more conspicuous was another member of the knotweed family, an apparently new kind of knotweed related to *Polygonella*. The plants of this shrub formed mats three to eight feet in diameter, the tough woody branches ascending only at the tips were very copiously foliaceous with small clavate leaves, but unfortunately neither flowers nor fruits were present. The most dainty flower of the region was the *Conradina*. This mint-

¹ It is said usually to be somewhat assurgent.



In fern grotto near Pineola, Florida, December, 1918. Perpendicular side of a cañon with the eroded rock covered with ferns. At least six different kinds of ferns may be distinguished. The more prominent lace-like leaf represents a species only known from that part of Florida. It is *Asplenium Curliissii*, named for the first botanist who visited the Pineola grottoes in 1881.

relative grew with wand-like branches several feet tall, each bearing several of the delicate magenta and spotted corollas.

Finally Sebring was reached, where a half hour was devoted to taking subsistence, the only stop for that purpose during the day.

We were soon on our way eastward. Outside of Sebring we "negotiated" some sand-hills with difficulty, but soon came into the flat woods. Finally the right of way, cut through the pine woods, faded into nothingness in the distance. We could not understand the phenomenon until we had almost gotten out of the woods. The optical illusion was caused by looking out on an immense prairie. We had not expected to meet such an extensive prairie, but there it was, flanked with pine woods and hammock islands, all of which was soon lost to view, because of the speed of our travel, leaving almost nothing in sight except saw-palmetto and various low herbs, and sky. We were now north of Lake Istokpoga and nearing the Kissimmee River. These prairies evidently represent a northwestward extension of the Everglades and the Okeechobee basin with the Kissimmee River meandering through the lower parts.

We crossed Arbuckle Creek, drove around to the southeast and ran between Lake Istokpoga and the Kissimmee River. There the prairie became dotted with hammocks and cypress-heads of various sizes.

Lake Istokpoga, like Lake Okeechobee, has several feeders, but only one outlet.¹ This stream runs eastward and empties into the Kissimmee River. Just before crossing Istokpoga Creek our car bogged in a wet spot in the prairie and an hour was consumed in digging it out. Although the sun was just about setting we managed to photograph this stream. It is bordered by beautiful hammocks which are made up of oaks and maples among other deciduous trees, and the live-oak copiously draped with Spanish-moss. Shrubs were numerous and the southern-elder (*Sambucus intermedia*) formed dense thickets. In the

¹ Of course, only the natural outlets are referred to here. No less than five water-highways now connect Lake Okeechobee with the eastern coastal region, and a large canal planned to connect Lake Istokpoga with Lake Okeechobee is under construction.

stream itself were spatter-docks (*Nymphaea*), water-lilies (*Castalia*), and maiden-cane (*Panicum hemitomon*).

We reached the Kissimmee River about twilight, just too late to use the two photographic plates we had been saving for use there. Thus far the Kissimmee had eluded our camera. We were now in the old flood plain of the Kissimmee which resembles that of the Saint John's River further north, but it is uncultivated, being now, as for many years past, devoted to pasturage.

Although peninsular Florida is relatively flat and often apparently monotonous, the topography has not yet been well worked out. One very interesting point that impressed itself on us during this excursion was the fact that the watershed of the Saint John's River on the east overlaps that of the Kissimmee on the west. The divide seems to be the ridge of old sand-dunes that runs from west of Lake George southward, skirting the coast region east of Lake Okeechobee and southward along the rim of the Everglades. Curiously enough, the chain of lakes of the Saint John's basin has received English names, while those of the Kissimmee basin have maintained the names given them by the Indians.

We crossed the Kissimmee River just above the site of Fort Bassinger. For several miles on the eastern side of the River the trail is elevated on an embankment over the river flats. There we narrowly escaped running into a bridgeless culvert and were saved only by the bright light of the full moon. We were not long in reaching the settlement of Bassinger and a short distance beyond it brought us out on the prairie region north of Lake Okeechobee. The full moon was as bright as only a Florida moon can be. We found a trail leading to the southeast and headed for Okeechobee City, which has swallowed up both the name and the site of Tantie and is situated on the Onothohatchee or Taylor's Creek about three miles from Lake Okeechobee.

When we had gone only a short distance from Bassinger the timer of our motor broke down, but the moonlight was so bright that we mended it without using our electric lamp. Once more on the trail we sped along, going in all directions of the compass

in order to dodge sloughs and ponds, but whichever way we turned the trail always brought us back to the southeast. The flora of this prairie has never been collected, unless to a slight extent by the surgeons of the military forces that were on it during the Seminole Wars, and now circumstances brought the writer there at night.

Animal life was more conspicuous on the prairie at night than were plants. Various quadrupeds and numerous birds scattered as we approached them.

Not a sign of civilization came to view until we saw the lights of Okeechobee City in the distance. We were now approaching country we had traversed before. We did not stop at Okeechobee City, but continued our journey and headed for Fort Pierce.

We had looked forward to smooth riding from Okeechobee to Miami; but we were sorely disappointed and had it forcibly impressed upon us that destruction in Florida is not confined alone to things natural, but also to things *material*. Twenty-four of the thirty-six miles of the road from Okeechobee City to Fort Pierce were about perfect when we traveled it a year and a half before. This night it was a wreck, simply from use and lack of a little care. We cannot recall a more uncomfortable ride than that one and we did not get into Fort Pierce until midnight or in eighteen hours traveling time from Arcadia. Miami was our objective, as already stated, and we decided to make it by six o'clock in the morning.

The main question was how to keep awake on the last quarter of the twenty-four hour drive. Mr. DeWinkeler agreed to drive until we reached Miami if the writer would keep him awake. This plan agreed to, we called caffeine to our assistance and each of us partook of three large cups of black coffee, and then started on our final one hundred and thirty mile drive. South of Fort Pierce the timer of the motor began to show signs of failing, and about the time we reached a hammock a few miles south of the town it failed completely. In the end, it was fortunate that it broke down there, as we wanted several plants from the hammock. While the timer was being repaired, a second

time by moonlight, the writer hunted the hammock for the desired plants, with the aid of the flash-light we had been saving for just such an occasion, and secured them without, incidentally, picking up a rattle-snake or coralsnake.

The plant particularly wanted was a little *Peperomia* referred to in a previous paper.¹ Especial interest in it had developed since the earlier excursion, on account of the close relative found in the caves near Pineola described above. Investigation showed that the plant from the Pineola caves is the same as the *Peperomia* first found in the United States in eastern Florida in the earlier part of the last century, and mentioned above. The week before our discovery of it near the western coast, Charles T. Simpson and John Soar found it growing en masse on shell mounds south of Daytona on the eastern coast. Otherwise, for a hundred years, it was known only from the shell mounds near the mouth of the Saint John's River. It is endemic in Florida.

The little plant from the hammock south of Fort Pierce turns out to be the same as the one we collected in Snake Hammock near Coot Bay back of Flamingo, Cape Sable, in the spring of 1917, and it also represents a West Indian species not heretofore credited to the flora of the United States. Recent exploration has added two species of *Peperomia* to the flora of the United States, and we now have four species, representing three groups of the genus, instead of two species, or one representing each of two groups.

We traveled on over the high sand-dunes in the vicinity of Hobe Sound and Jupiter, and shortly came into view of West Palm Beach. There, the only nocturnal restaurant enabled us to indulge in three more cups of black coffee, and we reached Miami shortly after sunrise safe and sound, but, unfortunately, confronted by a full day's work on our specimens.

SOUTHERN EVERGLADE REGION

The remaining day available for field work was devoted to territory midway between Royal Palm Hammock and Cape

¹ Journal of the New York Botanical Garden 19: 77. 1918.

Sable. This excursion was made possible by the roadbed of the Ingraham Highway, Miami to Cape Sable, and lateral canal then under construction. We drove our car as far as the roadbed had been temporarily surfaced, and thence proceeded as far as the dredge had excavated a channel, in the motor-boat belonging to the dredge. We passed within sight of Hammer Key, where we had collected the previous spring,¹ and pressed on to hammocks of a different character, judging from our superficial examination. Their characteristic vegetation, however, is yet to be studied.

The most striking growth on the low prairie several miles southwest of Royal Plam Hammock was open stunted forests of pond-cypress trees, small, but with all the appearances of great age. At that time of the year they were leafless and stood scattered on the prairie, suggesting so many gray specters with scraggy outstretched arms.

About ten miles southwest of Royal Palm Hammock the rock changes from the Miami oölite to the Lossmans River limestone. Naturally we should find somewhat different vegetation on the latter. The most conspicuous difference in the hammocks on the Lossmans River limestone is the saw-cabbage palm (*Paurotis Wrightii*), raising its crowns above the other vegetation. This palm was maturing its fruits about the time of our visit. The numerous elongate spadices bearing myriads of berries were very conspicuous, particularly the half ripe fruits which were bright red, so brilliant that the large plumes resemble tongues of flame above the other hammock vegetation. Occasionally clumps of an almost pure growth of this palm occurred in the open Everglades.

Within the hammocks high-climbing orchids were often not only evident, but abundant. Two kinds grew there, representing two different divisions of the genus *Vanilla*. One (*Vanilla phaeantha*) had broad leaf-blades up to six inches in length. This plant was discovered in these hammocks several weeks before our visit by Mr. Charles A. Mosier, Custodian of Royal Palm Hammock. The other (*Vanilla articulata*) was in equal abundance, and is leafless. Each of these orchids had been

¹ Journal of the New York Botanical Garden 20: 191-207. 1919.

found in Florida only once before, and both times in hammocks on the Lossmans River limestone. Another kind of vanilla (*Vanilla Eggersii*) grows naturally in Florida. However, it occurs only at two known stations, the one in the Deering Hammock in Miami, the other in the Madeira Hammock near the Bay of Florida not more than ten miles from the locality where we found the two species mentioned above.

Aside from the excursion to Pensacola, more than twelve hundred miles in the peninsula were covered both for making collections and observations. Several days were spent about Miami, Buena Vista, and Cutler in field-work. Herbarium specimens and living plants of such kinds as we particularly wished to study were gathered. We covered considerable ground never before visited by a botanist, determined the geographic range of several species more correctly, discovered several species of plants new to science, and secured a number of photographs of the fern-grottoes and caves, and of other localities that in the near future will be much devastated or destroyed.

JOHN K. SMALL.

SATURDAY AND SUNDAY SPRING LECTURES, 1920

Free public lectures will be delivered in the lecture hall of the museum building of the Garden on Saturday and Sunday afternoons, at four o'clock, as outlined below. Most of the lectures will be illustrated with lantern slides and the style of presentation will be simple and popular, so that the average high-school pupil should readily understand them.

The Sunday lectures are being inaugurated this spring, with the hope of reaching persons who can not be present on Saturdays. With this idea in mind, a practical lecture on growing vegetables has been arranged for each course. The flower shows in May and June will be open both on Saturday and Sunday, as heretofore.

A number of very interesting subjects will be presented in these courses; and many of the lecturers, who are prominent

and busy men, have inconvenienced themselves considerably to accept appointments. Mr. John Burroughs is expected to be present on April 24, when Dr. Fisher speaks. Mr. Beebe, on April 25, will describe and show lantern slides of the strange and wonderful things he has seen in South America. The relation of animals to plants will be discussed by two lecturers, Dr. Olive and Professor Gies. A new method of grafting has been discovered by the distinguished surgeon, Dr. Robert T. Morris, who will describe it on May 29 and give his experiences in growing nut trees. Professor Massey, of Cornell University, is an expert on rose diseases; Mr. Wister is President of the new American Iris Society;—the other lecturers are well known to our members. Mr. Carl Bannwart, of Newark, New Jersey, will close the spring course on May 30 with a lecture appropriate to Decoration Day.

SATURDAY LECTURES

April 17. "Vegetable Gardening," Mr. J. G. Curtis.

April 24. "With John Burroughs at Slabsides," Dr. G. C. Fisher.

May 1. "Flowers for the Home Garden," Mr. G. V. Nash.

May 8. "Plant Motives in Primitive and Egyptian Decorative Art," Dr. W. A. Murrill.

(Exhibition of Flowers, May 8 and 9.)

May 15. "Floral and Scenic Features of Chile," Mr. G. T. Hastings.

May 22. "The Dependence of Animals on Plants," Prof. W. J. Gies.

May 29. "Growing and Grafting Nut Trees," Dr. R. T. Morris.

June 5. "The Diseases of Roses," Prof. L. M. Massey.

June 12. "The History and Development of the Iris," Mr. J. C. Wister.

(Exhibition of Roses, Peonies, and Irises, June 12 and 13.)

June 19. "New York as a Center for the Amateur Botanist," Mr. Norman Taylor.

June 26. "Evergreens for American Gardens," Mr. Arthur Herrington.

SUNDAY LECTURES

- April 18. "The Big Trees of California," Dr. H. A. Gleason.
 April 25. "Jungle Peace," Mr. William Beebe.
 May 2. "Vegetables for the Home Garden," Mr. H. Findlay.
 May 9. "The Importance of Plants as Compared with Animals," Dr. E. W. Olive.
 (Exhibition of Flowers, May 8 and 9.)
 May 16. "Late Spring Flowers," Dr. N. L. Britton.
 May 23. "Plant Motives in Greek and Early Christian Decorative Art," Dr. W. A. Merrill.
 May 30. "Historic and Memorial Trees," Mr. Carl Bannwart.

W. A. MERRILL

HARDY WOODY PLANTS IN THE NEW YORK
BOTANICAL GARDEN

(Continued)

OLEACEAE. Olive Family

Forestiera ligustrina. PRIVET FORESTIERA.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Chionanthus. FRINGE TREE**Chionanthus virginica.** FRINGE TREE.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Ligustrum. PRIVET**Ligustrum acuminatum.** SHARP-POINTED PRIVET.

Location: Fruticetum.

Natural distribution: Japan.

Ligustrum acuminatum var. **macrocarpum.** LARGE-FRUITED
SHARP-POINTED PRIVET.

Location: Fruticetum.

Ligustrum amurense. AMUR PRIVET.

Location: Fruticetum.

Natural distribution: Amur region, China, and Japan.

Ligustrum Ibota. IBOTA PRIVET.

Location: Fruticetum.

Natural distribution: Japan and China.

Ligustrum Ibota var. **Regelianum.** REGEL'S PRIVET.

Location: Fruticetum. Lake Bridge.

Ligustrum ovalifolium. CALIFORNIA PRIVET.

Location: Fruticetum.

Natural distribution: Japan.

Ligustrum ovalifolium var. **aureo-marginatum.** GOLDEN-MARGINED PRIVET.

Location: Fruticetum.

Horticultural origin.

Ligustrum ovalifolium var. **elegantissimum.** ELEGANT CALIFORNIA PRIVET.

Location: Fruticetum.

Ligustrum Quihoui. QUIHOU'S PRIVET.

Location: Fruticetum.

Natural distribution: China.

Ligustrum sinense var. **Stauntonii.** STAUNTON'S CHINESE PRIVET.

Location: Fruticetum.

Natural distribution: China and Korea.

Ligustrum vulgare. COMMON PRIVET.

Location: Fruticetum.

Natural distribution: Europe, northern Africa, and western Asia.

Ligustrum vulgare var. **buxifolium.** BOX-LEAVED COMMON PRIVET.

Location: Fruticetum.

Natural distribution: Europe.

Ligustrum vulgare var. **sempervirens.** EVERGREEN COMMON PRIVET.

Location: Fruticetum.

LOGANIACEAE. Logania Family

Buddleia. SUMMER LILAC**Buddleia Davidi.** SUMMER LILAC.

Location: Fruticetum.

Natural distribution: China.

Buddleia Davidi var. **magnifica**. CREPE SUMMER LILAC.

Location: Fruticetum.

Buddleia Davidi var. **superba**. BRIGHT-EYED SUMMER LILAC.

Location: Fruticetum.

Buddleia Davidi var. **Veitchiana**. VEITCH'S SUMMER LILAC.

Location: Fruticetum.

Buddleia nivea var. **yunnanensis**. YUNNAN SUMMER LILAC.

Location: Fruticetum.

Natural distribution: Southern China.

ASCLEPIADACEAE. Milkweed Family

Marsdenia. MARSDENIA

Marsdenia erecta. HARDY MARSDENIA.

Location: Fruticetum.

Natural distribution: Southeastern Europe and Syria.

VERBENACEAE. Vervain Family

Callicarpa. CALLICARPA

Callicarpa japonica. JAPANESE CALLICARPA.

Location: Fruticetum.

Natural distribution: Japan.

Callicarpa purpurea. CHINESE CALLICARPA.

Location: Fruticetum.

Natural distribution: Japan and China.

Vitex. CHASTE-TREE

Vitex Agnus-castus. CHASTE-TREE.

Location: Fruticetum.

Natural distribution: Southern Europe and western Asia.

Vitex Negundo var. **incisa**. CUT-LEAVED CHINESE CHASTE-TREE.

Location: Fruticetum.

Natural distribution: Northern China and Mongolia.

Clerodendron. CLERODENDRON

Clerodendron trichotomum. KUSAGI.

Location: Fruticetum.

Natural distribution: Japan.

SOLANACEAE. Potato Family

Lycium. MATRIMONY VINE**Lycium chinense.** CHINESE MATRIMONY VINE.

Location: Fruticetum.

Natural distribution: China.

Lycium halimifolium. MATRIMONY VINE.

Location: Fruticetum.

Natural distribution: China to southeastern Europe.

SCROPHULARIACEAE. Figwort Family

Penstemon. BEARD-TONGUE**Penstemon Scouleri.** SCOULER'S BEARD-TONGUE.

Location: Fruticetum.

Natural distribution: Northwestern North America.

Paulownia. PAULOWNIA**Paulownia tomentosa.** PAULOWNIA.

Location: Arboretum. Mansion. Drinking fountain south-east of Museum.

Natural distribution: Central China.

BIGNONIACEAE. Trumpet-creper Family

Bignonia. TRUMPET-CREEPER**Bignonia radicans.** TRUMPET-CREEPER.

Location: Viticetum.

Natural distribution: Eastern North America.

Catalpa. CATALPA**Catalpa Catalpa** (*Catalpa bignonioides*). INDIAN BEAN.

Location: Arboretum. Harlem Depot plaza. Along road from Museum to Elevated Approach.

Natural distribution: Southeastern United States.

Catalpa Catalpa var. *nana*. DWARF INDIAN BEAN.

Location: Arboretum.

Horticultural origin.

Catalpa hybrida. HYBRID INDIAN BEAN

Location: Arboretum. Harlem Depot plaza.

Horticultural origin.

Catalpa ovata (*Catalpa Kaempferi*). KAEMPFER'S CATALPA.

Location: Arboretum. Herbaceous Grounds.

Natural distribution: China.

RUBIACEAE. MADDER FAMILY

Cephalanthus. BUTTON-BUSH

Cephalanthus occidentalis. BUTTON-BUSH.

Location: East end of Boulder Bridge. Wild, in wet places.

Natural distribution: Eastern North America.

CAPRIFOLIACEAE. Honeysuckle Family

Sambucus. ELDER

Sambucus canadensis. SWEET ELDER.

Location: Fruticetum. Herbaceous Grounds. Aquatic Garden. Wild, common in wet places.

Natural distribution: Eastern North America.

CONFERENCE NOTES FOR FEBRUARY

Professor W. A. Setchell of the Department of Botany of the University of California addressed the Conference of the Scientific Staff and Registered Students of the Garden in February on the subject "The Geographical Distribution of the Marine Spermatophytes." He reported that there are 34 or 35 well-recognized species of seed plants that live in the waters of the ocean. These belong in eight genera as follows: *Halophila*, *Enalus* and *Thalassia* of the family Hydrocharitaceae and *Zostera*, *Phyllospadix*, *Cymodocea*, *Diplanthera* (or *Halodule*) and *Posidonia* of the Potamogetonaceae.

All species of these two families are aquatic. Of the 35 species that are marine all but the three species of *Phyllospadix* live in shallow water but are so deeply submerged that they are seldom if ever uncovered by ordinary low tides.

A summary was given of the various investigations treating of the morphology, taxonomy and ecology of these plants. A special discussion was made of the temperature requirements of the various species as revealed by their geographical distribution.

This together with the data regarding these species and especially those of extensive distribution (*Halophila ovalis* and *Zostera marina*) will appear in detail in another journal in the near future. A summary of the principal points of general interest there to be presented by Professor Setchell is as follows:

"1. The marine spermatophytes are largely made up of plants surrounded by a medium whose temperature at any given time is the same for all parts of the plant. The species of *Phyllospadix* alone present to a certain extent, at least, the temperature conditions of terrestrial spermatophytes in that, at periods of low water, they have their roots in soil (or sand) of one temperature and their leaves in air of another. The majority of the marine spermatophytes live under a greater uniformity of temperature conditions than do the terrestrial spermatophytes.

"2. The marine spermatophytes live under conditions very similar to those experienced by the marine algae and show the same temperature-zone relations as the marine algae.

"3. The great majority of the species of the marine spermatophytes are confined strictly to one temperature zone of 5° C. amplitude of the monthly mean maximum of the surface waters. Such species are strictly stenothermal from every point of view and may be supposed to represent the normal type in distribution.

"4. There are certain species which extend over two zones of temperature. It seems possible in these cases, as it has also seemed possible in the cases of certain marine algae, to regard these marine spermatophytes as normal to one zone whence they invade the other because they find in certain localities of the invaded zone their proper temperature. The invasions of the marine spermatophytes, also like those of the marine algae, proceed in two directions in the cases of the two-zoned species, viz., from a warmer into a colder zone because of the existence of warmer spots among the colder areas normal to the zone—or—from a colder into a warmer zone because of a seasonal lowering of the temperature of the warmer zone or portions of it.

"5. There are a few species which are credited to more than two temperature zones and such are also found among the marine

algae. It may be that these species being normal to one temperature zone, may invade not only one zone, but two or more additional zones because of the existence of localities or seasons of suitable temperature. This movement may be in only one direction from the normal zone, as in the case of *Halophila ovalis*, or it may be in two directions from the normal zone as seems to be the case with *Zostera marina*.

"6. Finally attention may be called to the difficulties attending the study of the distribution of a species caused by the incompleteness of our knowledge of its homogeneity or the lack of it, its persistence through one or more seasons, its dependence upon spore reproduction or its ability to persist through vegetative multiplication, its seasons of flowering, fruiting, etc., in different portions of its range, any difference in habitat in different portions of its range, and any other matters which may be characteristic of the behavior of the species and which may possibly vary according to locality. The case of *Zostera marina* certainly indicates how much it is desirable to increase our knowledge of such species before we may feel certain that we are in any advantageous position to discuss the factors concerned in their very extensive distribution."

A. B. STOUT,
Secretary of the Conference.

NOTES, NEWS AND COMMENT

Professor W. C. Coker, of the University of North Carolina, spent the latter part of March at the Garden consulting the mycological herbarium and the library.

Professor H. S. Jackson, of Lafayette, Indiana, spent several days at the Garden in February consulting the library and mycological herbarium in connection with monographic work on the rusts for *North American Flora*.

Dr. Alfred Rehder, of the Arnold Arboretum, visited the Garden on March 16 for the study of various woody plants.

Mr. C. H. Bissell of Southington, Conn., was a recent visitor.

Dr. E. Mead Wilcox, for some years Professor of Botany in the University of Nebraska, called at the Garden on the 5th of March. He has since sailed for Santo Domingo where he will occupy the post of Director of the newly established Agricultural Station. The Garden is counting upon Dr. Wilcox's cooperation in its study of the island's flora.

Professor Jacques Hadamard, Collège de France, Paris, mathematician and botanist, visited the Garden in March. He will travel to Texas to lecture on mathematics at the Rice Institute in Houston, and is expecting to make botanical collections in the Gulf States, the West Indies and Panama.

Dr. W. A. Murrill lectured in Chicago on "Edible and Poisonous Fungi" before the Convention of the Woman's National Farm and Garden Association on the evening of March 22, and on "The Use of Plants in Design" at the Art Institute on the evening of March 23.

An exceptionally good collection of fungi, consisting mainly of resupinate polypores, accompanied by complete field notes, has been sent in to the Garden from Toledo, Ohio, by Mr. W. R. Lowater.

A large series of ferns and flowering plants from Mexico and Central America recently received from the National Museum is being installed and incorporated in the Garden Herbarium.

Two valuable collections of plants from the little known Big Cypress Swamp in southern peninsular Florida has been added to the permanent collections. One is a large series of miscellaneous specimens. The other comprises about forty specimens of the medicinal plants used by the Big Cypress Seminole Indians. This is the first collection of its kind brought together.

Rev. H. M. Denslow, a member of the Torrey Botanical Club and our most experienced local student of orchids, has commenced a geographical arrangement of our specimens of North American Orchidaceae. In accord with his suggestion at a recent meeting of the Club he is indicating on outline maps for each species the states from which we have representatives.

The attendance at the Greenhouse lectures at Range 2 was excellent in spite of the unusually severe weather conditions. Illustrating the lectures with living plants stimulated much interest and many questions were asked.

The first class in advanced biology in the Evander Childs High School visited the Garden on March 12 to study the specimens of fungi in the Museum. Mr. George T. Hastings was in charge of the class and Dr. Seaver and Dr. Murrill gave brief talks.

The making of new concrete benches for the Propagating House is nearly completed. These are long-needed improvements. Also a new tank is under construction.

Meteorology for January.—The total precipitation for the month was 2.59½ inches of which 0.725 inches (7¼ inches snow measurement) fell as snow. The maximum temperatures for each week were 49° on the 1st, 40° on the 8th, 42° on the 13th, 35° on the 21st and 53° on the 27th. The minimum temperatures were 5° on the 5th, 10° on the 6th, 5° on the 16th and 4° on the 20th.

Meteorology for February.—The total precipitation at the New York Botanical Garden for the month was 4.17 inches including 2.2 inches (22 inches snow measurement) of snow. The maximum temperatures for each week were 46° on the 3d, on the 11th, and on the 22d, and 44° on the 24th. The minimum temperatures were —4° on the 1st, 19° on the 9th, 8° on the 16th, 13° on the 17th and 6° on the 27th.

JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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PUBLICATIONS OF THE STAFF, SCHOLARS AND
STUDENTS OF THE NEW YORK BOTANICAL
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- Mosses of Madagascar. *Bryologist* 22: 27, 27. 15 J1 1919. [Review.]
- Notes on North American Sphagnum—VIII. *Bryologist* 22: 45-49. Issue for S 1919.
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- Some fictitious botanists. *Jour. N. Y. Bot. Gard.* 20: 171-181. Issue for S 1919.
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- Boynton, K. R.** *Sedum spectabile*. *Addisonia* 4: 3. pl. 122. 31 Mr 1919.
- *Eupatorium coelestinum*. *Addisonia* 4: 39, 40. 30 Je 1919.
- *Arctotis grandis*. *Addisonia* 4: 45, 46. pl. 143. 30 S 1919.
- *Centaurea montana*. *Addisonia* 4: 57. pl. 149. 30 S 1919.

- *Lilium Henryi*. *Addisonia* 4: 65, 66. *pl.* 153. 31 D 1919.
- *Poinsettia heterophylla*. *Addisonia* 4: 77, 78. *pl.* 159. 31 D 1919.
- Britton, E. G.** West Indian mosses in Florida. *Bryologist* 22: 2. 20 F 1919.
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- Britton, N. L.** Dr. Henry Allan Gleason appointed First Assistant. *Jour. N. Y. Bot. Gard.* 20: 39, 40. Issue for F 1919.
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- Britton, N. L., & Rose, J. N.** The Cactaceae. Descriptions and illustrations of plants of the Cactus family, i-vii + 1-236. *pl.* 1-36 + *f.* 1-301. Washington. 1919.
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- Complimentary dinner to Dr. Britton. *Jour. N. Y. Bot. Gard.* 20: 126, 127. Issue for Je 1919.

- What is ecology? *Torrey* 19: 89-91. 9 J1 1919.
- Taxonomic studies in *Vernonia* and related genera. *Bull. Torrey Club* 46: 235-252. 31 J1 1919.
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- *Viburnum Lantana*. Addisonia 4: 55, 56. pl. 148.
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- *Bryophyllum crenatum*. Addisonia 4: 65. pl. 152.
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- *Crataegus Calpodendron*. Addisonia 4: 67, 68. pl. 154.
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ABOUT PAULOWNIA TREES

For several years past an increasing number of young *Paulownia* trees have been observed within the New York Botanical Garden reservation, springing up in thickets and in woodlands from wind-borne seeds of the larger trees, and many of them have been cut out, a process necessary to continue; it seems desirable to somewhat decrease the number of large trees in order to reduce the nuisance; the number of seeds produced by a large tree is enormous, each of the pods containing several hundred, and pods are produced very abundantly. The seeds are small and thin, readily transported to considerable distances on the wind.

These seedling Paulownias grow very rapidly during their first few years. The tree standing near the drinking fountain southeast of the museum building, described and illustrated by Mr. Nash in Garden JOURNAL 8: 13-16, 1907, grew fourteen feet in its second season, and growths from eight to twelve feet are commonly observable. They slow down, however, after the second or third year, the individual above mentioned being now, after thirteen years' growth, about forty feet high, the average growth of a tree fourteen years old being thus about three feet, and probably not adding more than two feet to its height annually at present; its trunk circumference in November 1919 at four

feet above the ground, is forty and one-half inches, its diameter therefore not quite thirteen inches, and it has thus increased in thickness an average of a little less than one inch a year during its life. The immense *Paulownia* standing just south of the mansion was there as a very much smaller tree when that building was constructed in 1856, according to Mr. A. H. Wallace, the mason who built its walls, and who, despite his years, is a frequent visitor. Assuming that this tree was set out in 1850, it is about seventy years old; its height is approximately sixty feet and its trunk diameter is four feet one inch. In latter years it has increased in height scarcely at all, and has shown evidences of decrepitude, severe pruning of large dead branches having been necessary. It may be that this giant individual is larger than the tree ordinarily becomes in its native home in Japan, inasmuch as Professor Miyabe told us during a recent visit that he had no recollection of seeing one so large before.

Trees of two and three years old bear enormous round leaves, sometimes up to thirty inches in diameter, these being among the largest leaves produced by any tree, and very interesting. In spring, when covered with large, purple, viscid, odorous flowers, which appear before the leaves unfold, Paulownias are beautiful and conspicuous. They are often called Empress Tree.

On account of technical features of flower and fruit structure, *Paulownia* has been classified by botanists as a genus of the Figwort Family (Scrophulariaceae), to which snapdragons, calceolarias, and a great number of other herbaceous plants belong. It is aberrant in that family, however, being almost the only tree included. Recently, Dr. Francis W. Pennell of the Garden staff, who is monographing the family for *North American Flora*, has restudied the flowers and fruit in detail, from which it appears that the genus may be more rationally referable to the Bignonia Family, nearly all trees, shrubs or woody vines, to which the Catalpas belong, the last having large leaves similar to those of *Paulownia*—a relationship long ago suggested by the famous Swiss botanist, A. P. de Candolle.

N. L. BRITTON

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Continued)

Viburnum. VIBURNUM

- Viburnum acerifolium.** DOCKMACKIE.
 Location: Fruticetum. Triangle east of Museum. Herbaceous Grounds shelter. Wild, common.
 Natural distribution: Northeastern North America.
- Viburnum burejaeticum.** MANCHURIAN VIBURNUM.
 Location: Fruticetum.
 Natural distribution: Northern China and Manchuria.
- Viburnum Carlesii.** FRAGRANT VIBURNUM.
 Location: Fruticetum.
 Natural distribution: Corea.
- Viburnum cassinoides.** WITHE-ROD.
 Location: Fruticetum.
 Natural distribution: Northeastern North America.
- Viburnum dentatum.** ARROW-WOOD.
 Location: Fruticetum.
 Natural distribution: Eastern North America.
- Viburnum dilatatum.** THUNBERG'S VIBURNUM.
 Location: Fruticetum.
 Natural distribution: China and Japan.
- Viburnum erosum.** EROSE VIBURNUM.
 Location: Fruticetum.
 Natural distribution: Japan.
- Viburnum hupehense.** HUPEH VIBURNUM.
 Location: Fruticetum.
 Natural distribution: Central China.
- Viburnum Lantana.** WAYFARING TREE.
 Location: Fruticetum.
 Natural distribution: Europe and western Asia.
- Viburnum Lentago.** NANNY-BERRY.
 Location: Fruticetum. Wild, scarce.
 Natural distribution: Eastern North America.

Viburnum macrocephalum. LARGE-CLUSTERED VIBURNUM.

Location: Fruticetum.

Natural distribution: China.

Viburnum nudum. LARGER WITHE-ROD.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Viburnum Opulus. EUROPEAN CRANBERRY-TREE.

Location: Fruticetum.

Natural distribution: Europe, northern Africa, and northern Asia.

Viburnum Opulus var. **nanum.** DWARF CRANBERRY-BUSH.

Location: Fruticetum.

Horticultural origin.

Viburnum Opulus var. **sterile.** GUELDER ROSE.

Location: Fruticetum.

Viburnum Opulus var. **xanthocarpum.** YELLOW-FRUITED EUROPEAN CRANBERRY-TREE.

Location: Fruticetum.

Viburnum prunifolium. BLACK HAW.

Location: Fruticetum. Herbaceous Grounds. Wild, common.

Natural distribution: Eastern United States.

Viburnum pubescens. DOWNY-LEAVED ARROW-WOOD.

Location: Fruticetum.

Natural distribution: Eastern United States.

Viburnum rufidulum. SOUTHERN BLACK HAW.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Viburnum Sargentii. CHINESE CRANBERRY-TREE.

Location: Fruticetum.

Natural distribution: Northern China and Japan.

Viburnum Sieboldi. SIEBOLD'S VIBURNUM.

Location: Fruticetum. East end of Long Bridge.

Natural distribution: Japan.

Viburnum tomentosum. WOOLLY VIBURNUM.

Location: Fruticetum.

Natural distribution: China and Japan.

Viburnum tomentosum var. **plenum**. JAPANESE SNOWBALL.

Location: Fruticetum.

Horticultural origin.

Viburnum tomentosum var. **rotundifolium**. EARLY JAPANESE SNOWBALL.

Location: Fruticetum.

Viburnum venosum. VEINY ARROW-WOOD.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Viburnum venosum var. **Canbyi**. CANBY'S ARROW-WOOD.

Location: Fruticetum. Triangle east of Boulder Bridge.

Natural distribution: Delaware to Pennsylvania.

Symphoricarpos. SYMPHORICARPOS

Symphoricarpos albus var. **laevigatus**. SMOOTH SNOWBERRY.

Location: Fruticetum. West of Museum.

Natural distribution: Northern North America.

Symphoricarpos albus var. **laevigatus variegatus**. VARIEGATED SMOOTH SNOWBERRY.

Location: Fruticetum.

Horticultural origin.

Symphoricarpos occidentalis. WOLFBERRY.

Location: Fruticetum.

Natural distribution: Western North America.

Symphoricarpos Symphoricarpos (*Symphoricarpos vulgaris*). CORAL-BERRY.

Location: Fruticetum. West of Museum.

Natural distribution: Eastern United States.

Symphoricarpos Symphoricarpos var. **variegatus**. VARIEGATED CORAL-BERRY.

Location: Fruticetum.

Horticultural origin.

Abelia. ABELIA

Abelia grandiflora. GARDEN ABELIA.

Location: Fruticetum. Conservatory bed 9.

Hybrid.

Lonicera. HONEYSUCKLE**Lonicera Alberti.** ALBERT'S HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Turkestan.

Lonicera alpigena. MOUNTAIN HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Central and southern Europe.

Lonicera bella. ZABEL'S HONEYSUCKLE.

Location: Fruticetum.

Hybrid.

Lonicera bella var. **albida.** ZABEL'S WHITE HONEYSUCKLE.

Location: Fruticetum.

Lonicera bella var. **atrorosea.** ZABEL'S DARK ROSE HONEY
SUCKLE.

Location: Fruticetum.

Lonicera bella var. **candida.** ZABEL'S SNOWY HONEYSUCKLE.

Location: Fruticetum.

Lonicera bella var. **rosea.** ZABEL'S ROSE HONEYSUCKLE.

Location: Fruticetum.

Lonicera chaetocarpa. HAIRY-FRUITED HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Western China.

Lonicera chrysantha. YELLOW-FLOWERED HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Northeastern Asia to central Japan.

Lonicera chrysantha var. **Regeliana.** REGEL'S HONEYSUCKLE.

Location: Fruticetum.

Lonicera coerulea var. **dependens.** TURKESTAN FLY-HONEY-
SUCKLE.

Location: Fruticetum.

Natural distribution: Turkestan.

Lonicera coerulea var. **edulis.** SIBERIAN FLY-HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Siberia and northern China.

Lonicera coerulea var. **Kirilovi.** KIRILOV'S FLY-HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Turkestan.

CONFERENCE NOTES FOR MARCH

The March Conference of the Scientific Staff and Registered Students of the Garden was held on the afternoon of March 3d. The program presented was as follows:

"The flower in the genus *Hemianthus*," by Dr. F. W. Pennell.

"The genus *Peperomia* in Florida," by Dr. J. K. Small.

Dr. Pennell discussed the evolution of the flower of the genus *Hemianthus* Nutt. This genus belongs to the tribe Gratioleae of the family Scrophulariaceae and is characterized by its minute and exceedingly modified flower. The derivation of this from the normal and also the primitive types of that tribe was shown, and the peculiarities of *Hemianthus* held to illustrate four principles, (a) reduction in number of parts, shown in all portions of the flower; (b) union of parts, shown in the calyx and corolla; (c) tendency to increasing zygomorphy, *i.e.*, irregular but bilateral symmetry; and (d) various irregular and particular changes, such as may be reduced to no definite class. It was held that these last are the best criteria of more immediate relationship, and that especially the very strangely modified stamens of *Hemianthus* and its peculiarly striated seeds best tell its kinship, while the flower, altered as it is in number and union of parts, is in those respects like plants of quite remote affinity. Also it was emphasized that while parts united may again become free, as is shown by the styles of *Hemianthus*, there is never a tendency for parts that have become rudimentary or lost to reappear. The fifth stamen of *Hemianthus* as in most other of the Scrophulariaceae is permanently lost and in this genus two more of the stamens are also usually aborted.

Dr. Small reported on the Florida species of *Peperomia*, narrating the history of the discovery of each, and showing specimens of the five known to date. Several of these are Dr. Small's own findings in Florida, and a few he has described as new to science. The genus is a wide-spread tropical one, belonging to the pepper family, and in Florida is confined to the peninsula, mainly its southern subtropical portion.

A. B. STOUT,

Secretary of the Conference

NOTES, NEWS AND COMMENT

Mr. F. S. Collins of North Easton, Mass., author of "The Green Algae of North America" and other well-known works on the algae, was a visitor at the Garden on March 24 and 25.

Mr. H. Guthrie Smith, of Tutira, New Zealand, was a visitor at the Garden April 2, en route to Scotland. Mr. Smith has been a student of the New Zealand flora for nearly forty years, devoting chief attention to the introduction of foreign plants. Contrary to the statement of Hooker, he finds that foreign species are seldom if ever able to compete successfully with the native vegetation, and are always limited to areas influenced by man.

Dr. A. B. Stout, of the Garden staff, recently gave an address before the Biological Club of Princeton University on the subject of "Fertility and Sterility in Plants."

A dendrograph has been installed on a maple in the Botanical Garden. This apparatus was devised by Dr. D. T. MacDougal, formerly of the Garden staff and now Director of the Department of Botanical Research, Carnegie Institution of Washington. The dendrograph is used in obtaining a continuous record of growth and other changes in the volume of tree trunks. The instrument records such changes automatically with remarkable precision and after it is properly installed no attention is necessary except a weekly visit to remove and replace the record blanks and to wind the eight-day clock of the recording drum. The particular instrument installed in the Garden was supplied by Dr. MacDougal and records obtained will be used by him together with others obtained on various specimens of trees growing in widely separated parts of the United States.

Meteorology for March.—The total precipitation for the month was 3.16 inches of which 0.40 inches (4 inches snow measurement) fell as snow. The maximum temperatures recorded for each week were 47° on the 5th, 57° on the 10th, 55° on the 16th, 73° on the 25th and 74° on the 31st. The minimum temperatures were 11° on the 7th and the 8th, 19° on the 14th, 24° on the 19th, and 31° on the 25th.

ACCESSIONS

PLANTS AND SEEDS

- 3 plants of *Zygocactus*. (Given by Mrs. E. Cornell.)
- 1 plant of *Serissa foetida*. (Given by Mr. E. D. Adams.)
- 6 plants of *Taxus canadensis*. (Given by Dr. L. R. Morris.)
- 1 plant of *Robinia*. (Given by Mr. W. W. Ashe.)
- 7 plants of *Thrinax* from Porto Rico. (Given by Mr. D. W. May.)
- 5 plants for conservatories. (Given by Mr. Donker, through Dr. J. K. Small.)
- 1 plant of *Dracaena*. (Given by Mrs. Simon Sterne.)
- 1 plant of *Corallorrhiza maculata*. (Given by Mr. M. L. Bryant.)
- 1 plant of *Dryopteris setigera*. (Given by Mr. Severin Rapp.)
- 158 hardy woody plants. (By exchange with Hicks & Son.)
- 1 plant of *Citrus decumana*. (Given by Mr. S. Corker.)
- 1 plant for nursery. (Given by Mr. D. S. George.)
- 1 plant of *Peperomia cumulicola*. (Given by Mr. John Soar.)
- 3 plants of *Ampelopsis aconitifolia*. (Given by Mr. H. Wolfgang.)
- 2 plants of *Cyanotis kewensis*. (Given by Mr. H. W. Becker.)
- 1 plant of *Sansevieria*. (Given by Mr. S. A. Wade.)
- 3 plants of *Cimicifuga gigantea*. (Given by Mr. James Stuart.)
- 1 plant for conservatories. (Given by Mr. R. A. Gilliam.)
- 2 plants of *Arisaema triphyllum*. (Given by Miss M. E. Kittredge.)
- 5 plants of *Acacia*. (Given by Mr. Louis Dupuy.)
- 23 plants of *Acacia* for Range 2. (Purchased.)
- 8 plants of *Nephrolepis*. (Purchased.)
- 200 plants of Douglas spruce for Victory Grove. (Purchased.)
- 50 plants of white fir for horticultural garden. (Purchased.)
- 41 Florida plants. (Collected by Dr. J. K. Small.)
- 7 plants of *Lonicera plicata*. (Given by Mr. John Finley.)
- 1 plant from Santo Domingo. (Given by Mr. W. L. Abbott.)
- 4 plants of *Opuntia* from South Carolina. (Collected by Dr. J. K. Small.)
- 8 plants of *Opuntia* from North Carolina. (Collected by Dr. J. K. Small.)
- 2 plants of *Opuntia* from Florida. (Collected by Mr. J. A. Harris.)
- 11 plants of *Gaylussacia brachycera* from Perry Co., Penn. (Collected by Dr. J. K. Small.)
- 35 cactus plants from Florida. (Collected by Dr. J. K. Small.)
- 2 plants of sundew from New Jersey. (Collected by Dr. F. W. Pennell.)
- 8 plants of *Opuntia*. (By exchange with Mr. J. A. Harris.)
- 1 plant of *Agave Victoriae-Reginae*. (By exchange with Mr. W. H. Bickelhaupt.)
- 3 plants of yarrow. (By exchange with U. S. Dept. of Agric.)
- 2 cactus plants. (By exchange with U. S. Dept. Agric., through Dr. J. N. Rose.)
- 2 plants of *Epiphyllum*. (By exchange with U. S. Dept. Agric.)
- 148 plants for conservatories and nurseries. (By exchange with Bureau of Plant Industry.)
- 1 plant of *Cattleya Trianae*. (By exchange with Mr. Adam Muller.)
- 7 plants from the Bahamas. (Collected by Mr. L. I. Brace.)

JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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River-cypress strand on the eastern shore of Lake Okeechobee, comprises one of the most impressive sights in the State. Large portions, however, have been destroyed by fire. The humus in some places has been burning for several consecutive years. After a fire the giant trees fall down and are either sawed into lumber or left to decay. The trees often harbor great quantities of Florida moss (*Dendropogon*), but few other air-plants.

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CYPRESS AND POPULATION IN FLORIDA

THE RELATION OF PHYTOGEOGRAPHY TO THE DRIFT OF POPULATION AS SHOWN IN THE CASE OF TAXODIUM

WITH PLATES 245-247

Some botanical genius with a taste for research will come along some day and show how closely related, at least according to our text-books, has ever been plant geography and political geography. This is not in reference to the redistribution or readjustment of floras which usually follow man's advent in new fields. It is in reference to what existed there before man's advent, or before the botanist's advent, at any rate.

Consider the case of our valuable cypress forests, for example—of *Taxodium*, otherwise known as cypress, bald-cypress, river-cypress, pond-cypress, whence the "wood-eternal" as the lumber advertisements have it.

The geographic range of this deciduous-leaved conifer—whence one of its common names, bald-cypress—is confined almost wholly to the Atlantic and the Gulf Coastal Plains, extending from southern New Jersey to Florida, southern Indiana, southern Missouri, and Texas.

The habitats often assigned for it are "River-swamps usually submerged during several months of the year, low wet banks of streams, and the wet depressions of Pine-barrens."¹

In passing, it may be mentioned that while the more acute taxonomists of a century ago had already discerned two kinds or species of *Taxodium*, generations of their less acute successors

¹ C. S. Sargent, *Manual of Trees of North America* 72. 1905.

still recognized but one. Not until the beginning of this century were the two species again clearly segregated.¹ In this connection consider also the above quoted statement of habitats. It is in the river-swamps and along the stream-banks that we find the *Taxodium distichum*—river-cypress, that which was described in 1753, while that of the pine barrens is *Taxodium ascendens*—pond-cypress, which was confused with the former cited species up to 1818, when it was separated under varietal rank, but was not recognized as a distinct species until 1833.

But the point is this: that less than a score of years ago the recorded southern limit for the geographic distribution of either cypress *still coincided almost exactly with the geographic limit of Florida's modern development.*

In leading works on trees² about the beginning of this present century under the paragraphs devoted to the geographic distribution of this conifer we may read ". . . southward near the coast *to the shores of Mosquito Inlet and Cape Romano. . .*" The italics are ours. These two localities represented, as a matter of fact, not the southern limit of *Taxodium*, but of modern civilization, on the east and the west coast respectively down almost or quite to the present generation. A straight line connecting these regions of settlement diagonally divides peninsular Florida in two almost equal parts,—that lying to the northwest of the line, long ago pretty well settled, that lying to the southeast, until recently practically unsettled, or relatively speaking, the former a *terra cognita*, the latter a *terra incognita*. In this instance, at least, botany had waited on the railroads. The comparatively recent extension of the railway along the eastern coast of Florida from New Smyrna to Miami, and later to Key West, made possible—even easy—access to a storehouse of botanical lore hitherto closed.

Curiously enough, the arbitrary line of division above referred to also divides, in a general way, the higher portion of the state from the lower portion.

¹ R. M. Harper, Bulletin of the Torrey Botanical Club 29: 383-399. 1902; 32: 105-115. 1905.

² C. S. Sargent, Silva 10: 153. 1896; Manual of the Trees of North America 72. 1905.



Pond-cypress head in the Big Cypress Swamp. This species grows more in heads than in strands. Heads may comprise a few trees or may extend over many acres of area. The growth of cypress in the southern part of the peninsula, particularly the pond-cypress, has not yet been greatly devastated, but proposed highways into the frontier parts of that region will invite large lumbering operations. The trees of the pond-cypress are the favorite harbors for several species of air-plants (*Tillandsia*).

Strange that the Big Cypress Swamp—which has been so designated on maps of Florida, at least since 1849—should have been excluded from this recorded geographic range of the cypress! Whence the name, if cypress did not grow there? Likewise, on the lower eastern coast the cypress was not hidden from view, in fact it is so prominent a feature on the old trail and main highway that it seems hardly possible that it could have been kept out of the records of distribution.

There are several ways to account for this rather striking political development of Florida—however much we lack the phytogeographic explanation; but none is wholly satisfactory. Perhaps the most logical theory is that as the Seminoles migrated southward, they followed the line of least resistance, which, in this case, was the higher part of the peninsula. As they proceeded southward they probably exterminated or absorbed the remnants of the aborigines that had escaped the Spanish. Then about the beginning of the last century, when the white man from the United States got glimpses of Florida beyond the frontier borderlands, he set out in turn to exterminate the Seminole along these Seminole trails, and this process continued for nearly half a century. During this period, Florida meanwhile becoming part of the United States, the territory from which the red man was driven became dotted with forts, many of which became permanent settlements and soon developed into towns.

The business of Indian hunting was not confined to the north-western division of the peninsula, of course. Many forts were located far down in the southeast and southwest. But here the lines of communication were so tenuous, and the swamps and marshes so vast, and the Indians so able to hold their own, that civilization faltered, and failed to take hold. It is a melancholy but noteworthy fact that although our government spent treasure and blood prodigally in this land of botanical luxuriance, our botanical knowledge of it remained virtually at a standstill. For much of Florida, so it has remained ever since. In the lower part of the peninsula—in the Everglades, in the Big Cypress, among the Ten Thousand Islands, and even north of Okeechobee—there are still miles of lonely wilderness.

But it was these observations on the cypress along the frontier settlements in the last century that probably crystalized the recorded southern limit of the distribution of this remarkably important forest and timber tree. Thus, I suppose we must account for the coincidence of the southern cypress-limit and the limit of political distribution.

Now, notwithstanding this definite statement which stood so long regarding the geographic distribution of the cypress in the state, there is, perhaps, more cypress in Florida outside of the recorded area than within it. As a matter of fact, its range extends southward almost or quite to the Cape Sable region, that is to say, the extreme southern tip of the peninsula. It is the abundance that renders the former detailed records of distribution at once so absurd and so difficult to interpret.

We can understand to some extent, at least, the oversight or ignoring of its occurrence in the interior, even if the Big Cypress Swamp did appear on early maps. But botanists and dendrologists were not ignorant of the vegetation of the eastern coast of Florida. In fact, the main features had been quite well known for the past several generations.

There, particularly on the lower eastern coast, both species of the cypress approach nearly or quite to the sea, at least—and at many points—to the coastal lagoons. The river-cypress follows nearly all the streams flowing from the Everglades to the Atlantic Ocean almost as far south as Cutler, the southernmost settlement on the eastern coast. It is common in the Snapper Creek hammocks a few miles north of Cutler and was always a conspicuous element in the arboreous vegetation along the west and south branches of the Miami River, a stream quite well known to botanists for over half a century.

The pond-cypress does not extend as far south on the eastern coast as its larger relative, but it is often conspicuous in the landscape.

Thus the stereotyped record of distribution of *Taxodium* in Florida neglects at least four great regions. They are, the Lake Okeechobee basin, the Big Cypress Swamp, the lower eastern coastal district, and the southern end of the Everglades.



Two kinds of cypress, river-cypress (*Taxodium distichum*) on left, pond-cypress (*T. ascendens*) on right. Besides the differences in habit as shown in the two preceding plates, the trees differ in the leaves, not alone in the position, but in the shape. The fruits of the two species have not yet been carefully compared.

In all these regions occur both kinds of cypress—*Taxodium distichum* and *Taxodium ascendens*. The river-bottoms, the lake shores, and the "sloughs" support the first-named species, which is known as river-cypress. The other species, known as pond-cypress, is usually confined to the prairies and low pine-lands, although it does occur rarely on sand-dunes—for example, on those near Juno on the Atlantic coast. The greatest development of the pond-cypress is doubtless in the Big Cypress Swamp, while the common cypress is apparently most copiously developed in the Lake Okeechobee region and upper Saint John's basin.

The vastness of growth of the large cypress in the Okeechobee basin can be appreciated only by seeing it. The shores of the lake, particularly the eastern and northern shore, the tributary streams, notably the Kissimmee River, the Onoohatchee, Cypress Creek, Mosquito Creek, and Fisheating Creek, and outlying sloughs often support almost impenetrable stands of beautiful trees. The trunks, tall and clear of branches, furnish the favorite material for the dug-out canoes of the Cow Creek Seminoles. The cypress forest on the eastern shore of Lake Okeechobee is one of the most impressive sights in all Florida.

The prairies that surround the fringe of the Everglades, which in turn encompass Okeechobee, are also high, but occasional lower areas support considerable pond-cypress.

The region of the Big Cypress Swamp is typically low prairie, hence a vast development of the pond-cypress. In other words, much of the cypress of the Big Cypress is not big. However, the large cypress is not wanting. In the Okaloacoochee Slough, smaller sloughs, and on lake shores we find beautiful forests of large trees. The Okaloacoochee Slough is the favorite locality for the Big Cypress Seminoles to obtain canoe material.

The eastern coastal region is well supplied with cypress. It occurs along nearly all the creeks and rivers, in the intersecting prairies of the Everglade Keys, and on the edges of the Everglades—there principally as isolated cypress heads. These clumps of cypress trees, both large and small, are much affected as temporary camping places by Seminoles as they travel to and from their permanent camps. The trees in the river bottoms are also large enough to furnish the materials for their canoes.

In several ways the southern end of the Everglades or the prairie between the Everglade Keys and the Bay of Florida is particularly interesting. There we find the most stunted growth of the pond-cypress and the most massive growth of the other species. On the one hand, we find vast areas with a growth of small pond-cypress trees about as high as one's head or twice as high, but with all the appearances of great age. On the other hand, there we find the most massive development of the river-cypress.

South of the latitude of Royal Palm Hammock one may see large dome-like masses of vegetation which, from the distance of a mile or two, he would consider to be good-sized Everglade hammocks. Imagine the surprise of the writer when he investigated one of these seeming hammocks several years ago, and found it to be a single cypress tree!

These large cypress trees are not, however, like those further north—so stately and straight, branching often only at the top. The trunks are usually short, as well as stout. In the case of the individual just referred to above, the trunk—about twelve feet in diameter—was branched ten feet from the ground. The branches grew nearly at right angles to the main stem, and were in themselves as large as good-sized trees.

Another very interesting feature of this region of the little cypress trees and the big cypress trees is the association of this typically fresh-water plant with the mangrove, a typically salt-water plant.

The cypress extends well down towards the influence of salt water, if not actually to it, while the mangrove extends up into the prairies far beyond any apparent saline influence. When we penetrate further south it will be interesting to learn if the cypress actually reaches the influence of the tide of the Bay of Florida. This, however, is apt to remain a mystery for many years. Florida is a land of underground rivers, and perhaps of underground tidal currents as well.

JOHN K. SMALL

VOCATIONAL EDUCATION IN GARDENING FOR DISABLED AND CONVALESCENT SOLDIERS AND SAILORS

The vocational training of gardeners in the New York Botanical Garden actually began on January 16, 1919, one disabled soldier beginning training at that time under an agreement between the Garden and the Federal Board for Vocational Education. Until March 3, 1919, strictly practical training was given under our gardeners. On that date the number of men in training had reached seven and they were formed into the first class of instruction. Since that time the number of students sent by the Federal Board has increased to fifty during January, and five civilians have been in the classes at one time or another.

The training of young gardeners is an important problem before the horticultural world today. The National Association of Gardeners is considering it at present, studying ways and means of interesting young men in gardening as a profession. Undoubtedly the Old World method of apprenticeship has trained the best gardeners. The present day problem is to get into our training as much of this method as possible, as well as a certain amount of scientific study and horticultural interest. Garden labor is scarce at the present time, and in competition with other industries is losing ground, owing to the extreme wages paid by other lines. Then, too, as recently pointed out by one of the experts of the profession, the beginner in gardening, the garden laborer or apprentice, does not show the interest, does not care to study, is not inspired to broaden out in the science of gardening as it is talked, written, and lectured about today. Most of the gardening education of today tends toward these latter points and the training here has covered these and in some measure the need also for practical apprentice-training. Starting with younger students, who are in good health, with a system of strictly practical training, under competent gardeners, together with the study of soils, botany, plant materials, pathology, entomology, and other related subjects and the broadening influences of horticultural literature, flower exhibitions, etc., the

ideal training would result. The percentage of persons naturally adapted to gardening is not large. We have found young men whose fathers before them were successful gardeners and florists, and though they themselves were strictly at home with plants, still they did not care to continue in the profession. However, it is probable that a sufficient number of young men can be found who will take to the work and become successes in it. For the disabled veteran of the war, gardening or one of its branches should give an interesting, healthful occupation, and the same percentage of his class would qualify as of any other at the present day. It is a matter of selection and individual preference.

Our practical training has been carried on in accordance with the seasonal work around the Garden and conservatories. Practice in care of houses and the plants in them has been accomplished both by individual work of students with our gardeners and in small classes. This work has included potting and tubbing of large conservatory plants, such as would be encountered in the conservatories of large country estates, the washing of plants for scale insects, care and potting of orchids and ferns, pruning and arrangement of plants in houses, the spraying of these plants with hand sprays, and general practice in watering, ventilation, and the maintenance of conditions in greenhouses for the growth of different types of plants.

The propagation of many of the commoner greenhouse plants, such as *Acalypha*, *Aucuba*, *Begonia*, *Bougainvillea*, *Cestrum*, *Clivia*, crotons, *Dracaena*, *Fittonia*, *Eranthemum*, *Ficus*, *Lantana*, bay trees, *Aralia*, and *Sansevieria* has been attempted on a small scale. The propagation of the common bedding plants and geraniums has been carried on during the winter. Varieties of *Coleus*, *Alternanthera*, *Iresine*, *Ageratum*, *Echeveria*, *Vinca*, *Cuphea*, and *Santolina* have been propagated by cuttings on a large scale. This practice has been done in the propagating houses, with comparatively large classes, and with almost uniform success. The constant practice of making and rooting cuttings, potting up when rooted and shifting when necessary, together with the general care of the small houses, has been of very practical value. Seeds have been sown of the more common greenhouse flowering

plants, such as *Cyclamen*, primrose, and *Gloxinia*, for flowering next summer, fall and winter; seeds of the early vegetables and of our annual garden flowers have also been sown. The sowing of vegetable and annual seeds is especially in point for the students who worked among them last year. Practice in forcing some of the bulbous plants, such as *Narcissus*, miniature hyacinths, and tulips, was also carried on, some of these flowers being placed on exhibition at Range No. 2.

The outdoor gardening practice has been varied. The first of this attempted by the school was spraying for scale insects during March, 1919. Hugh O'Neill, a student who had previously worked for the Newark, N. J., Shade Tree Commission, handled the extension apparatus as easily with the right hand and crook of the left elbow, as he had before he lost his hand in France. Beginning April 14, a course in vegetable gardening was given. The smaller crops were grown in small gardens on the site of the School Garden plots east of the Lorillard Mansion. Radishes, onions, beets, chard, parsley, carrots, salsify, lettuce, and spinach were grown here. Each student had a plot to himself, and harvested many messes of fresh picked vegetables. An area south of the Nursery was devoted to the larger crops, such as beans, potatoes, corn, cabbage, celery, kale, egg-plant and tomatoes. One disabled student, with an artificial leg, could do the work encountered in the care of such gardens, but he was not able to walk great distances for the other work.

Flower gardening commenced in the spring of 1919 with the spading of the flower beds. Annual flowering plants were planted out in the spaces left by the bulbs, peonies were disbudded and made an unusually fine display, many spaces devoted to perennials were renovated, general care was given to the collections, and chrysanthemums were planted for fall blooming.

The growing of the prominent outdoor flowering plants proved more interesting to most of the students than many other phases of gardening work. The large collection of *Gladiolus* in the Horticultural Collections was planted by the class, cared for, and dug in the fall. Variety studies were made, and lists prepared by the more advanced students for use in their own gardens

STUDENTS

Name	Entered	Dura- tion	Left	Diability
Abbott, Thomas T., Paterson, N. J.	September 8, 1919	1 yr.		Valvular heart disease
Baiaro, Carmelo, Dobbs Ferry, N. Y.	April 4, 1919	1 yr.		Gun shot wound, foot
Bland, Frank A., New York	April 5, 1920	1 yr.		Shell shock
Bernstein, William, New York	February 9, 1920	1 yr.	April 1, 1920	Tuberculosis arrested
Blumberg, Isidor, New York	February 17, 1919	1 yr.	September 15, 1919	Neurasthenia
Byrd, George S., Peckskill, N. Y.	February 24, 1919	1 yr.	October 1, 1919	Tuberculosis arrested. Heart and stomach
Brunt, Warren J., Philadelphia, Pa.	December 9, 1919	1 yr.	April 1, 1920	Gunshot wound. Tuberculosis arrested
Caples, Jeremiah, Wellingford, Conn.	July 7, 1919	1 yr.		Loss one thumb joint. Ankylosis
Cerrone, jr., Anthony, Mount Vernon, N. Y.	July 7, 1919	1 yr.		Chronic otitis media
Christof, George J., New York	January 5, 1920	3 mo.		Tuberculosis arrested
Colburn, Miss Daisy, New York	March 15, 1920	1 yr.		Tuberculosis. Gassed
Curatol, Lawrence, Tuckahoe, N. Y.	August 16, 1919	2 mo.	March 8, 1920	Tuberculosis arrested
Devaney, Patrick J., Dayton, Ohio	January 5, 1920	1 yr.	March 15, 1920	Tuberculosis arrested
Downing, Edward, New York	May 1, 1919	1 yr.		Shell shock
Edmonds, Lloyd G., Front Royal, Va.	February 13, 1920	1 yr.		Stomach trouble
Ewing, Henry O., New York	April 29, 1919	1 yr.		Eye trouble
Fabrizio, Michael, New York	May 12, 1919	1 yr.	May 20, 1919	Gunshot wound. Partial paralysis
Fagan, Hugh, New York	January 19, 1920	1 yr.		Injured knee
Feltham, Thomas, Newport, R. I.	February 17, 1919	6 mo.	October 1, 1919	Tuberculosis
Flanagan, Peter, New York	November 21, 1919	1 yr.	January 16, 1920	Gunshot wound. Loss right eye
Galino, Felix, New York	November 10, 1919	1 yr.	April 1, 1920	Amputated left leg
Ganyard, Raymond A., Cleveland, Ohio	April 17, 1919	1 yr.	June 18, 1919	Gassed
Graham, Charles, Vonkers, N. Y.	March 3, 1920	3 mo.	April 1, 1920	Psychoneurosis. Gunshot wound leg and finger
Hamm, Howard H., New York	December 9, 1919	1 yr.		Gassed
Healy, Raymond C., New York	October 28, 1919	1 yr.	February 15, 1920	Gunshot wound mouth. Gassed. Dyspnoea
Hohmann, Edward, Brooklyn, N. Y.	November 2, 1920	1 yr.		Tuberculosis arrested
Holt, Platt E., New York	March 1, 1920		March 15, 1920	Tuberculosis arrested
Greebler, Benny, New York	October 23, 1919	1 yr.	April 10, 1920	Tuberculosis arrested

STUDENTS—Continued

Name	Entered	Duration	Left	Disability
Jacobs, Louis N., Petersburg, Fla.....	October 21, 1919	1 yr.	April 1, 1920	Tuberculosis arrested
Jones, Joseph B., New York.....	November 17, 1919	6 mo.	April 1, 1920	Mastoiditis. Otitis media
Killeen, John J., New York.....	January 19, 1920		April 1, 1920	Diabetes
Koch, Emil, New York.....	December 1, 1919	1 yr.	March 15, 1920	Gunshot wound leg
Lair, Henry T., Lawrenceville, N. J.....	June 24, 1919		June 24, 1919	Tuberculosis arrested
Landrum, Warren R., Hattisburg, Miss.....	March 3, 1919	1 yr.	October 10, 1919	Tuberculosis arrested
Lane, John, New York.....	February 10, 1920		March 1, 1920	Tuberculosis arrested
Laterwech, Stephen, Ansonia, Conn.....	May 21, 1919	1 yr.		Eye and ear troubles
Laura, Joseph B., New York.....	October 21, 1919	1 yr.		Tuberculosis arrested
Loftus, Thomas, Norwich, N. Y.....	April 17, 1919	1 yr.	June 6, 1919	Shrapnel wound. Gassed
Marcus, Nathan, New York.....	January 26, 1920	1 yr.		Heart trouble
McAllister, Henry, New York.....	February 9, 1920	1 yr.	April 1, 1920	Acute rheumatism
Meyerowitz, Nathan, New York.....	June 9, 1919	1 yr.		Tuberculosis
Murray, Walter J., New York.....	June 24, 1919	1 yr.	January 15, 1920	Nervous trouble
Napoli, Louis, New York.....	March 3, 1919	1 yr.		
Nembach, Albert B., Port Washington, N. Y.....	February 18, 1920		April 1, 1920	Tuberculosis arrested
Newman, Egnatius, New York.....	January 5, 1920	1 yr.		Tuberculosis arrested
O'Brien, William J., Brooklyn, N. Y.....	January 5, 1920	6 mo.	March 1, 1920	Tuberculosis arrested
O'Neill, Hugh F., New Haven, Conn.....	March 11, 1919	1 yr.		Amputated left hand
Palmeri, Umberto, New York.....	November 10, 1919	6 mo.		Tuberculosis arrested
Paris, Frank, Yonkers, N. Y.....	October 28, 1919	1 yr.	January 5, 1920	Gunshot wound
Pauline, Laurence, Port Chester, N. Y.....	October 20, 1919	1 yr.		Chronic bronchitis. Tachycardia. Myocarditis
Poupard, Percy H., New York.....	January 12, 1920	1 yr.		Valvular heart trouble
Reilly, James B., New York.....	December 1, 1919	1 yr.		Loss of hearing. Ruptured ear drums
Rollins, Pinckney C., Washington, D. C.....	January 20, 1920	1 yr.		Gunshot wound. Gassed. Chronic nephritis
Sacchetti, Antonio, Yonkers, N. Y.....	August 1, 1919	1 yr.		Gunshot wound left arm and side
Schultz, John V., New York.....	January 29, 1920	1 yr.		Gunshot wound. Shrapnel wound

STUDENTS—Continued

Name	Entered	Duration	Left	Disability
Sheehan, Thomas, Brooklyn, N. Y.....	November 21, 1919	1 yr.		Partial paralysis of external and internal nerve of leg
Sindler, Thomas E., Islip, N. Y.....	February 3, 1919	1 yr.	May 16, 1919	Loss of hearing
Snyder, Walter F., Wurtsboro, N. Y.....	October 20, 1919	1 yr.	March 1, 1920	Tuberculosis
Sobel, Philip, New York.....	June 11, 1919	1 yr.		Tuberculosis arrested
Steele, William M., Yonkers, N. Y.....	July 22, 1919	3 mo.	March 1, 1920	Stiff finger. Mental deficiency
Swentzel, Henry C., New York.....	June 19, 1919	1 yr.	July 7, 1919	Compound fracture hip
Tanikawa, John M., Hilo, Hawaii.....	October 30, 1919	1 yr.		Gassed
Tare, Nathaniel, New York.....	March 15, 1920			Gunshot and shrapnel wounds. Gassed
Toole, John F., Clinton, Mass.....	June 2, 1919	1 yr.		Conjunctivitis. Gunshot wound ear
Ulrich, Max, New York.....	December 1, 1919	1 yr.		Tuberculosis arrested
Vacchio, Sebastiano, New York.....	June 2, 1919	1 yr.	March 15, 1920	Shrapnel wound left knee, limited flexion
Wager, William, New York.....	December 1, 1919	6 mo.	March 1, 1920	Wound in head. Fractured skull
Wagner, Arthur, New York.....	October 6, 1919	1 yr.		Operation for sinusitis and ethmoiditis
Weisinger, William, New York.....	November 21, 1919	1 yr.		Gassed
Willis, James M., New York.....	February 4, 1920	1 yr.		Gunshot wound chest and shoulder
Woertter, Charles, New York.....	January 13, 1920	1 yr.		Tuberculosis. Shell shock
Wozniak, Michael, Detroit, Mich.....	January 16, 1919	1 yr.	Died June 3, 1919	

later on. Some practice in planting the large collection of dahlias was given, and the types and varieties, which were so well arranged and bloomed so magnificently as to form an exceptional opportunity for study, were watched throughout the entire season. Cannas were included in the summer work with flowers. This spring some students have potted the large collection at Range No. 2, and it is to be hoped that the collection will make such a showing as it did in 1919. During the past winter the class has tried the propagation of the smaller evergreens, such as retinosporas, yews, junipers, etc., by cuttings placed in sand, and the propagation of many of our flowering shrubs by long cuttings, such as are used in propagating privet, willow and other shrubs. These cuttings are being stored until late spring, when they will be rooted in the open ground. Among the shrubs treated in this manner were *Forsythia*, *Corylus*, *Tamarix*, *Ribes*, *Viburnum*, *Sambucus*, weigela, *Benzoin*, *Kerria*, *Staphylea*, *Dirca*, and *Exochorda*.

During 1919, the students attended many practical demonstrations of path-building, grading, tree-moving and other branches of the park work.

The elementary study of plants and plant functions has been a continuous feature of the gardening course. Elementary botany, including a study of seeds, seedlings, buds, stems, leaves, flowers, and fruits, was given in the spring quarter of 1919, followed in the summer quarter by a course in elementary plant physiology. Botany was taken up again during the winter, and will be followed by more plant physiology for the new students. Garden zoology, a course devoted to the study of insects and animals encountered in horticultural work, was taken up during the spring and summer of 1919.

One afternoon a week throughout the year is devoted to garden botany, a study of the plant materials used in gardening and its branches, their identification, habit of growth, uses, and interesting features. During the winter months greenhouse plants, conifers, and broad-leaved evergreens are studied. In summer the flowering shrubs, trees, annual flowering plants, perennial border plants, bulbs, and bedding plants are considered at all stages of

their growth. Although a real knowledge of such a diversity of plant materials can only be gained through constant association with the plants, a general knowledge of relationships and conditions is acquired, sufficient to give ideas for location, planting, and care during growth, protection in buying, and interest to go beyond the rather limited scope covered in most gardening work. Broad-leaved and other evergreens for winter color and attractiveness; berry-bearing shrubs for winter color and food for our friends, the birds; plants, especially many natives, which are so well adapted to wild swampy spots and the banks of streams, are all considered. Although the old garden plants such as geraniums, salvias, petunias, and *Coleus* are the most easily learned, some of the more beautiful and more valuable kinds make the most lasting impression on the student. The Chinese *Abelia* will be remembered and planted when *Hydrangea paniculata grandiflora* is forgotten.

The Cyclopaedia of American Horticulture and the Illustrated Flora of the Northeastern States have been used for reference in this study of plants. These works are accessible to the students in their reading room at the Mansion. Text books on gardening and floriculture are furnished, through the Garden, by the Federal Board for Vocational Education.

KENNETH R. BOYNTON.

TREES GIRDLED BY MEADOW MICE

One day early in March, I saw about noon at the Elevated Approach a brown rat, a gray squirrel, and a cottontail rabbit. The first two were actively hunting for something to eat, while the rabbit sat on the snow with its eyes to the sun fast asleep.

The brown rat is always with us, and is not only very destructive but helps to spread many diseases. The gray squirrel continues to be the delight of park visitors in spite of its shiftless habits, its fondness for buds and maple sap, and the fact that it destroys birds' eggs and young birds before they are able to fly. Two specimens of the black variety are frequently seen in the

hemlock grove. The cottontail rabbit is fairly abundant in our grounds, making its nests near the buildings and being quite socially inclined. Although destructive in many sections, the injury done by them here is so slight as to be negligible. They seem to stand on top of the snow and reach for the young twigs, which they nip off with a clean cut. I do not know of a single case of girdling which can be attributed to them.

But the common meadow mouse is very destructive every winter, and has been unusually so during the one just past, doubtless owing to the abundance of snow and ice.

Walk through any grassy meadow and you will notice little runways forming a network over the surface of the soil and winding in and out among the vegetation. These are made by mice about as long as the common house mouse but with thicker body and shorter legs and tail. They keep the runways very smooth and free from straws so as to reach their burrows quickly in case of alarm.

In their comfortable nests of dry grass, several litters of from four to eleven young are reared each year. Hawks, owls, crows, foxes, weasels, cats, and other natural enemies prey upon them continually—and still they increase. They consume large quantities of growing and matured crops and often destroy entire orchards by gnawing the bark from the base of the trunks and roots of trees. In winter, they tunnel under the snow from one tree or shrub to another.

No store of food is laid up for cold weather by the southern species, but there is one in Alaska that gathers and hides in its nests a quart or more of little bulbous grass roots, which the Eskimo women search for eagerly and boil to serve to their guests during winter festivals.

To recount all the damage done by meadow mice in their search for food on our grounds during the past winter would make quite a story. A great many different kinds of trees and shrubs were attacked; and the attack was made in different ways according to the quality of the bark, the depth of the snow, the amount of dry grass present, etc.

The object of the mice being to get at the food stored in the

inner bark, it was necessary for them first to gnaw away the outer corky layers, after which the tender inner layers were consumed down to the wood. On account of this complete girdling no food can pass to the roots, which will be speedily starved out and the trees will die. In the case of shrubs, new shoots will spring up, but this will take some time.

Several of the splendid Japanese flowering cherries were completely girdled for a distance of six inches or a foot near the base. Four of these are young trees, six inches in diameter, and good bloomers; while one belongs to the first lot set out many years ago. Two other fine trees in the cherry orchard are nearly girdled and will either die or become practically worthless.

In the maple collection nearby, at least two trees have been destroyed; and four Japanese maples in the Fruticetum have been girdled. In the case of one of the latter, many of the lower limbs were covered with snow and these were entirely stripped of their bark. In the hawthorn collection, also, several trees have suffered in this way, but none appear to have been girdled.

Two lindens, one poplar, several wild cherries, and other trees scattered about the grounds have likewise suffered; but not to the same extent as the shrubs.

In the lilac collection recently installed on Pelham Parkway, containing many fine French varieties, between thirty and forty plants have been destroyed. In the weigela group north of the lake near the museum building, twelve of the large clusters have been completely girdled; while at the Mosholu Approach and elsewhere, the weigelas have suffered severely.

The Georgia syringa collection is planted in a low spot in the Fruticetum, where there is much grass and the snow lingered long. Here the mice camped among the stems a foot or more above the ground and played havoc with nearly every one of them, eight large clumps being destroyed. The oriental sweet shrub on the bank above seemed to be especially attractive to the mice, eight of these clusters having been destroyed.

A group of deciduous holly was wiped out; shrubs of the pea family; privets; willows; almost anything within reach seemed acceptable to this small, lurking enemy, which is so difficult to

combat. We shall have to accept our losses with equanimity; keep the grass down as much as possible; and hope for less snow another winter.

Bridge grafting is often recommended to save trees that have been partially girdled by mice. It is done in April, when active growth is beginning and before the wounds have dried out. My own feeling, however, is that the base of a tree is such a vulnerable point that it would probably be wiser to remove most trees thus injured and put in new ones.

W. A. MURRILL

CONFERENCE NOTES FOR APRIL

The April conference of the Scientific Staff and Registered Students of the Garden was held in the laboratory of the Museum Building, Wednesday, April 7, 1920, at 3:30 P.M. Dr. Marshall A. Howe spoke on "The Marine Algae of the Bahamas," illustrating the talk by numerous specimens, dried and in fluid.

The talk was chiefly a résumé and analysis of the speaker's account of the Bahamian algae contributed to the Britton and Millspaugh "Bahama Flora," then in press. This account was based mainly upon specimens collected by the speaker during three visits to the Bahamian archipelago made in 1904, 1905, and 1907, supplemented by earlier and smaller collections made by Dr. E. Palmer, Mr. and Mrs. John I. Northrup, Mrs. G. A. Hall, and Prof. W. C. Coker, and later ones made by Mr. Percy Wilson and Mr. L. J. K. Brace.

The Bahamian archipelago, according to the report of a former governor of the colony, consists of "29 islands, 661 cays, and 2,387 rocks," and, in addition to the coast lines offered by these islands, cays, and rocks, there are extensive areas of shallow water known as the Bahama Banks, areas of hundreds of square miles where the water is commonly from one foot to twenty feet deep. Most of the islands have shores that are in large part rocky, the rock being of oolitic or aeolian limestone and offering a good foothold for marine algae. The oolitic sand resulting from the decomposition of this rock is in some places too shifting

and unstable to allow any great development of algae, but it is usually rather compact and offers anchorage for many kinds of marine plants. Some of the Siphonaceous green algae, especially the Codiaceous genera *Penicillus*, *Rhipocephalus*, *Udotea*, *Halimeda*, and *Avrainvillea*, and certain species of *Caulerpa*, have a highly developed system of deeply penetrating rhizoids, which form compacted subterranean anchors, sometimes roughly suggesting the roots of carrots or parsnips, and by the aid of these they are able to maintain themselves on a sort of bottom that in more northern climes would be wholly destitute of the more conspicuous algae. Comparisons with the marine floras of Cuba, Jamaica, and Porto Rico and other parts of the West Indian region visited by the speaker, indicate that the Siphonales have their greatest development, both as to number of species and abundance of individuals, in the Bahama Islands and the adjacent Florida Keys.

If the diatoms are included, the list of known Bahamian algae now embraces 525 species, 6 species having been recognized since the Bahama Flora went to press. The known species are distributed in the principal groups as follows:

Rhodophyceae.....	157	species, representing	68	genera
Phaeophyceae.....	34	"	16	"
Chlorophyceae.....	96	"	40	"
Myxophyceae.....	62	"	27	"
Diatomaceae.....	176	"	39	"
Total.....	525	"	190	"

One difficult group of red algae, the Squamariaceae, of which much material is available, has not yet been critically studied, and several additions to the list may be expected from this family. There are also various minute epiphytes and endophytes that need more attention. And most of the collecting in the Bahamas has been done in the winter and spring months, when conditions as to temperature and mosquitoes are the most agreeable. Some of the marine algae have a narrowly seasonal appearance and a curiously local distribution. With more extensive and intensive collecting, covering all of the months of the year, it is certain that the above list will be materially enlarged.

A. B. STOUT,

Secretary of the Conference.

NOTES, NEWS AND COMMENT

Dr. and Mrs. N. L. Britton, Dr. Walter Mendelson, and Miss Dorothy Coker returned from Trinidad, May 2, bringing with them a large collection of specimens.

Professor Guy West Wilson, formerly employed at the Garden, has returned to the department of biology in Upper Iowa University, Fayette, Iowa. While at Clemson College in South Carolina, he collected a number of interesting fungi, an account of which will soon appear in *Mycologia*.

A widespread leaf-spot disease of the broad-leaved species of *Iris* has been reported from Wisconsin, California, New York, England, and elsewhere. The fungus passes the winter in the dead leaves, producing spores in the spring, which are distributed to new *Iris* leaves as they develop. Entrance into the leaf is through the breathing pores, the spores germinating on the surface and sending out mycelial threads which elongate until they reach the pores. The removal of dead infected leaves before the young leaves appear promises to be a successful means of control.

Mr. H. W. Becker, in charge of the Garden greenhouses, has had especial success in the control of ants. His method is by the use of nicotine, applied near their runways, on stems of plants, etc. He is sending a discussion of this to the *Gardeners' Chronicle*.

ACCESSIONS

PLANTS AND SEEDS

7 plants for conservatories. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

2 plants of *Coryphantha nivos*a. (By exchange with Mr. W. C. Fishlock.)

1 plant for conservatories. (By exchange with Dr. J. W. Harshberger.)

249 plants derived from seed.

7 bulbs of *Scilla maritima*. (Given by Dr. H. H. Rusby.)

5 bulbs of *Lilium superbum*. (Given by Mr. W. F. Marsh.)

2 bulbs of *Allium*. (Given by Mr. R. E. Dale.)

3 bulbs for conservatories. (Given by Mr. W. C. Fishlock.)

- 26 clumps of *Dahlia* roots. (By exchange with Mr. F. P. Quinby.)
- 8 orchids for the conservatories. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)
- 2 plants of *Echeveria*. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)
- 45 cactus plants for the conservatories. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)
- 4 plants of *Opuntia*. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)
- 5 plants of *Mamillaria*. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)
- 1 plant of *Opuntia Lindheimeri*. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)
- 5 plants of *Pelecypora pectinata*. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)
- 1 packet seed. (Given by Dr. H. H. Rusby.)
- 1 packet seed of *Magnolia acuminata*. (Given by Mr. Inglis Stuart.)
- 37 packets of seed. (Given by Mr. F. W. Longren.)
- 1 packet of seed. (Given by Mr. McDougal Hawks.)
- 14 packets of Colombia seed. (Given by Dr. Alexander Andrade.)
- 11 packets of seed from Ecuador. (Collected by Dr. J. N. Rose.)
- 2 packets of Florida seed. (Collected by Dr. J. K. Small.)
- 63 packets of seed. (Purchased.)
- 3 packets of seed. (By exchange with Director of Hort. Section, Giza Moudersish, Egypt.)
- 6 packets seed. (By exchange with the U. S. Nat. Mus., through Dr. J. N. Rose.)
- 169 packets of seed. (By exchange with Botanic Garden, Ottawa, Canada.)
- 3 packets of seed. (By exchange with Bureau of Plant Industry.)
- 1 packet seed. (By exchange with Royal Botanic Garden, Kew.)
- 1 plant of *Ardisia crenulata*. (Given by Mr. George Friedhof.)
- 8 plants from Florida. (Collected by Dr. J. K. Small.)
- 1 plant of *Guzmania*. (Given by Mr. Toussaint through Dr. J. K. Small.)
- 2 plants of *Psychotria bacteriophila*. (By exchange with U. S. Dept. of Agric.)
- 10 bulbs from Florida. (Collected by Dr. N. L. Britton.)
- 5 ferns from Florida. (Collected by Dr. N. L. Britton.)
- 1 pkt. of seed of *Oenothera canescens*. (Given by Miss E. M. Kittredge.)
- 1 pkt. of seed of *Potentilla sulphurea*. (Given by Bro. J. Peter.)
- 1 pkt. of seed of *Agave cupreata*. (By exchange with Dr. Wm. Trelease.)
- 1 pkt. of seed of *Crambe maritima*. (By exchange with Mr. Wm. Auld through Dr. J. K. Small.)
- 1 pkt. of seed of *Warea Carteri*. (Collected by Dr. N. L. Britton.)
- 1 pkt. of seed of *Zamia floridana*. (Collected by Mrs. N. L. Britton.)

MUSEUMS AND HERBARIUM

- 12 specimens of orchids for the local herbarium. (Given by the Rev. H. M. Denslow.)
- 1 specimen of *Clastobryum americanum* from Jamaica. (By exchange with Mr. L. J. Fessin.)

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JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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A BOTANICAL EXPEDITION TO TRINIDAD

TO THE SCIENTIFIC DIRECTORS OF THE NEW YORK BOTANICAL GARDEN.

Gentlemen: By permission of the Board of Managers, I was occupied during the period from February 16 to May 2, 1920, in making collections for the museums, herbarium and green-houses on the island of Trinidad, British West Indies. I was accompanied by Mrs. Britton, Dr. Walter Mendelson of the Garden Corporation, Professor Tracy E. Hazen of Barnard College, Miss Dorothy Coker and Mr. William R. Rowland. All participated in the work of collecting and preserving specimens, seeds and plants and this coöperation made possible the formation of a very large and valuable series of Trinidad plants which will enrich our representation of the flora of tropical America and the study of which will be an important contribution to the coöperative botanical investigation of northern South America and islands adjacent now being prosecuted by us with the United States National Museum and the Gray Herbarium of Harvard University.

Drs. Mendelson and Hazen were the official photographers of the expedition and they obtained several hundred negatives, many of which will be of value as records and for purposes of illustration. Those taken by Dr. Mendelson are mostly more humanistic than those by Dr. Hazen, who used up films and plates on botanical subjects with enthusiastic prodigality.

Dr. Mendelson was the voluntary medical officer for the party, but his services in this capacity, while gratefully accepted, were at no time required, the party maintaining increasingly good health; he found however, congenial opportunity, for medical discussions with others of his profession. Dr. Hazen gave especial attention to the collection of algae.

Sailing from New York February 16, under arctic conditions, on the steamship "Mayaro" of the Trinidad Shipping and Trading Company, ice and snow were soon left behind and the voyage proceeded with gradually rising temperatures over quiet seas. The little low island Sombrero, on the eastern side of the Anegada Channel, passed to port in the early morning of the sixth day out, is the first land sighted on this course, Anegada lies some forty-five miles to the west, and although invisible was much in my mind, recalling my interesting visit there with Mr. Fishlock in 1913.¹ During this sixth day of the trip, Dog, Anguilla and St. Martins Islands were passed on the port side, Saba very close on the starboard, St. Eustatius, St. Kitts and Nevis successively more distant, but visible, to port. St. Martins and St. Kitts brought pleasant recollections of my trip with Mr. Cowell in 1901.² No more land was seen until the numerous little Grenadine Islands were sighted, on this trip in the very early morning of the eighth day out, soon followed by Grenada, where the "Mayaro" came to anchor before breakfast time in the beautiful harbor of St. George at the southwest side of the island. We thus voyaged from near St. George, Staten Island, to St. George, Grenada, and from boreal to tropical environment.

The cargo gave us nearly a full day ashore on Grenada, enabling us to visit and study the charming botanical garden, located but a short distance from the port, and containing many perfect and beautiful specimens of tropical trees and other plants. Mr. Robert O. Williams, the Director, received us with great cordiality, and escorted us to points of botanical interest, enabling me to study and collect several of the native species of cacti, thus obtaining information which will be of service in my investi-

¹ Journ. N. Y. Bot. Gard. 14: 99-109. 1913.

² Journ. N. Y. Bot. Gard. 2: 161-166. 1901.

gation of these plants with Drs. J. N. Rose and D. T. MacDougal of the Carnegie Institution of Washington.

We arrived at Port of Spain, Trinidad, on the morning of February 25. Comfortable and convenient arrangements for our stay had been made by Miss Minerva Hart, Librarian of the Public Library and a daughter of the late John Hart, Director of the Trinidad Botanical Garden from 1887 to 1911, and to her we are indebted for much information, advice and assistance, during our visit. Our work was made easy and delightful through the valued coöperation of Mr. W. G. Freeman, Director of Agriculture, and all the members of his staff, who continually facilitated our operations in ways too numerous to mention.

Trinidad, with a land area of 1,974 square miles, is in a general way oblong, some 50 miles long north and south and some 30 miles wide, with a narrowing peninsula about 30 miles long projecting from the southwestern part and a shorter peninsula tipped by the several small Bocas Islands at the northeastern corner. A chain of hills and mountains with very steep slopes rising to elevations of a little over 3,000 feet, mostly of schists and hard limestones, perhaps of Jurassic or Cretaceous age, extends along the whole northern side, followed to the south by a broad low valley; a central range of hills with several isolated ones obliquely traverses the central part of the island from southwest to northeast with a line of elevations running off to the southeast; undulating and nearly level country occupies the south-central part and there is a long hill-system more or less parallel with the southern coast. With the exception of a few isolated hills all parts of the island south of the northern mountain range are supposed to be of Tertiary geological age or more recent. The river-system is extensive, of many small streams and brooks; there are three principal lagoon and swamp areas of considerable size; sea-beaches are numerous on the eastern and southern coasts, but elsewhere only local and small.

The forest area is extensive; composed of many species of trees, occupying at least one fourth of the island and much of it is held as government reserves and crown-lands, assuring an abundant fuel supply and the regulation of the flow of rivers

and streams, in which respect Trinidad is much better off than Porto Rico and the Virgin Islands. An enlightened policy has further provided an efficient system of forest protection, and of reforestation with valuable timber-trees; we are indebted to Mr. C. S. Rogers, Chief Forest Officer, for advice and information.

Savannas of considerable size occur in several districts, grassy areas often with scattered shrubs and small trees and highly specialized herbaceous vegetation; these are not only on plains, but also, locally on steep hillsides, and they differ a good deal in their component plants, many of the rarer and most interesting species being restricted in distribution. The soil of these savannas is for the most part not adapted to cultivation.

The road-system is elaborate and is excellently maintained, making it possible to visit nearly all parts of the island with dispatch and facility. Many miles of forest are traversed by roads, providing sections well adapted to the study of the native trees and other plants; most of the savanna areas are also crossed by roads and the coasts may be reached on them at many localities. The higher altitudes cannot, however, be reached by vehicles, but bridle paths lead high up at many points; the excellent mountain roads of Porto Rico, upon which transition from the hot lowlands to cool and breezy elevations of 2,000 feet and more is rapid, are not yet duplicated in Trinidad, but the orographic features of the two islands are dissimilar.

The distribution of the native plants here as elsewhere is for the most part dependent upon rainfall, soil, and altitude. The wettest parts of Trinidad are toward the northeastern side, where the trade-winds first impinge upon the northern mountain range and here the forests are most luxuriant. The driest parts are the Bocas Islands and the contiguous mainland of the northwestern coast, where the trees are small and cacti abound, as also a species of *Agave*. The higher elevations of the northern mountain range have a number of species not found below. The flora of the southwestern peninsula contains many species not found elsewhere upon the island. A detailed survey of the distribution of plants with relation to rainfall, soil, and altitude would be of great scientific value.

Our first collections were made at Carenage, on the north-eastern coast, on the afternoon of our arrival and on the next day at Cocorite, nearby, where numerous herbaceous species and cryptogams were found. On February 27th we visited the Piarco Savanna on the plain south of Arouca and obtained specimens of many characteristic savanna plants. A little *Drosera*, a *Polygala*, and an *Oldenlandia* reminded us of similar areas in the southeastern United States; adjacent woodlands contained many kinds of trees, shrubs and ferns, and lichens were abundant on the bark of trees and shrubs. Saddle Road, which crosses the hills near Port of Spain, was traversed on February 28 and here, among other interesting species, we first came close to the tree which forms striking gray patches on the hills above Port of Spain, and were surprised to find it a gigantic species of *Croton* (*C. gossypifolius*) attaining dimensions of a tree up to 50 feet high with a trunk a foot in diameter. With it were many trumpet-trees (*Cecropia*), their large leaves white beneath; and the bois immortelle (*Erythrina*), a tall tree introduced from northern South America for shading cocoa plantations, filled the valleys with glorious masses of orange flowers which appear before the leaves.

The care of the collections, and studies in the botanical garden and in the herbarium occupied our time for the most part for the next three days. On March 3, we visited Maqueripe, a beautiful little bay on the northern coast with a good bathing beach, and made considerable collections on rocky-wooded hillsides. Here a *Begonia* reaching 5 feet in height and the scarlet-flowered *Aphelandra* were striking floral features. Returning to Port of Spain, we first saw, near Carenage, the striking purple flowers of the Trinidad *Securidaca*, a vine of the Gay-wings Family, forming long wands.

On March 4, we drove through the Maracas and Acono Valleys to Ortinola Estate, where we were hospitably entertained by Mr. and Mrs. Stanhope Lovell, and collected many specimens along a clear mountain stream which flows through a cocoa plantation, including many ferns and mosses, and herewe first made the acquaintance of the showy white-spathed aroid *Spathi-*

phyllum and the curious herbaceous *Dorstenia* of the Mulberry Family.

The Aripo Savanna at Cumuto, which we visited on March 5, under the guidance of Mr. W. E. Broadway, Horticulturist and Assistant Botanist of the Trinidad Department of Agriculture, supports one of the most fascinating botanical associations ever studied by us. Over several hundred acres it simulates a northern meadow, with a large variety of grasses and sedges; several terrestrial bladderworts, yellow, white, and purple, the little white *Burmannia*, four kinds of ground orchids, a *Lycopodium*, two species of *Xyris*, and several herbaceous purple-flowered plants related to our *Rhexias* occur among the grasses and were eagerly collected. The savanna is enclosed by forests composed of a great variety of trees and shrubs; the stately palm *Mauritia* with its highly ornamental fruits, the graceful manac palm (*Euterpe*), and the showy rose-flowered *Isertia*, a small tree related to *Cinchona*, were of special interest, and many ferns, orchids, mosses, lichens, and fungi were also obtained.

March 6 and 7 were occupied in preserving the collection and in herbarium and garden studies, and March 8 and 9 were spent on a trip to the northeastern coast arranged for us by Mr. Freeman. The Mora Forest a few miles east of Sangre Grande is one of the most luxuriant, containing trees of great size, the Mora (*Dimorphandra excelsa*) and the Balata (*Mimusops Balata*) among the largest, with many high-climbing aroids (*Philodendron*) and other lianas. Large forest areas near Balandra Bay were also studied, and here we first encountered the very spiny climbing palm *Desmoncus* and the equally spiny slender cuesa palm (*Bactris cuesa*) and its relative *Bactris major*, both in fruit, with fruits very unlike. Climbing *Lygodium* ferns are abundant here; the very large sedge *Diplazia* with bright white flowers was conspicuous, and the woods yielded many ferns, mosses and other cryptogams. We are indebted to Mr. Frank Meungot for the use of his house at Balandra Bay and to Mr. and Mrs. E. A. Robinson of Nonpareil Estate for aid and hospitality, for the privilege of visiting their great plantation of Para rubber trees, the largest in Trinidad and one

of the largest in tropical America, and for a fine museum specimen of the rubber produced.

On March 10, after attention had been given to our rapidly increasing collection, a late afternoon drive was taken over the new Lady Chancellor Road, partly constructed over the rather dry hills north of Port of Spain and affording fine views of the city and the roadstead; here we first saw the locust-like tree *Coursetia arborea* in flower, blooming before its leaves appear, and the slender tree *Heliocarpus* of the Linden Family, also bare of leaves, but retaining its super-abundant little flat fringed fruits.

An examination of the vegetation of the Bocas Islands and adjacent Trinidad mainland was made from March 11 to March 14, using the staunch motor-launch "Marie," with a hotel on Gasparee Island as a base of operations. This region is wholly of rocky schistose and limestone hills, with very steep slopes and nearly vertical cliffs, and increasingly arid as followed from east to west. On the mainland at Teteron Bay, coastal banks and hillsides were studied; a fragrant yellow-flowered *Ouratea*, a shrub of the Ochna Family, was of special interest, an apparently native cotton (*Gossypium*) was found upon a beach, and here our first acquaintance was made with the native "Rose de Montagne" (*Brownea*), a tree of the Pea Family, its bright red flowers appearing in dense clusters on its trunk and branches, sometimes within a foot of the ground. Lichens growing on pure white quartz were collected with much interest. Gasparee Island yielded many lichens, an orange-colored one, covering the surfaces of hard limestone outcrops, being conspicuous, and here we first saw three of the large native cacti, later found in abundance on islands farther west. Monos Island, separated from the Trinidad mainland by the Boca de Monos, is rather densely wooded with small trees of many kinds, at this season of the year mostly leafless, and here we were hospitably received and entertained by Mr. A. A. Siegert. At the top of precipitous cliffs on the northern side we saw the slender palm *Coccothrinax*, subsequently seen in similar situations on the northern mainland, there always in situations extremely difficult of access. An

attempt to land on Huevos Island, separated from Monos by the Boca de Navios, met with failure, owing to heavy seas. We spent a day ashore on Chacachacare Island, separated from Huevos by the Boca de Huevos, where facilities for our work had kindly been provided at the Catholic Presbytery by the Rev. Father Sassen through the interest of Mr. J. E. Scheult, Chief Clerk of the Department of Agriculture. The vegetation of Chacachacare is almost wholly xerophytic; cacti abound at the lower elevations and on cliffs, among them the essentially spineless prickly pear, *Opuntia Boldinghii*, seen also on Patos and apparently indigenous on both islands,¹ together with the native endemic *Agave* (*A. evadens*), which was in full bloom at the time of our visit, its large panicles of bright yellow flowers very conspicuous. Three species of *Capparis*, small trees with white clustered flowers, are abundant.

A special expedition was made under the escort of Mr. Freeman to the small rocky Patos Island, which lies about six miles west of Chacachacare across the Boca Grande and within a few miles of the long, narrow mountainous peninsula of Venezuela. It is inhabited only by a keeper and assistant, whose duties consist in raising and lowering the British flag daily on a pole at the top, at an altitude of about 320 feet. Landing is prohibited, but the Trinidad Government kindly waived this restriction in our case and we had a most interesting day on shore, climbing over the intensely arid hills among the numerous cacti and low shrubs and trees. This is the only place within Trinidad territory where a turks-head cactus, the large cactus *Lemaireocereus* and a slender round, ribbed, arching *Cephalocereus* are known to exist, together with several other species of wide distribution. Few of the shrubs and trees were in bloom at the time of our visit, but collections had previously been made there by Mr. Broadway and R. O. Williams of the Department of Agriculture, under the more favorable conditions of the wet season, so that, collectively, we have a fair knowledge of its plant population,

¹ *Opuntia Boldinghii* Britton & Rose was first found by us in cultivation on Curacao, later on the coast of Venezuela, and had previously been collected on Margarita. See *Cactaceae* 1: 155. 1919.

which is not extensive as regards number of species. We returned to Gasparee through the high ocean rollers of the Boca Grande, the cacti securely packed in sacks and baskets as a precautionary measure and the whole collection protected against salt water by rubber sheets, while the mere presence of our medical officer effectually prevented mal de mer.

Returning to Port of Spain, we made a rapid transition on March 15 to the dense humid forest four miles east of Arima and there collected specimens of some 60 kinds of plants, not previously observed by us, including many ferns, mosses and other cryptogams, together with orchids and aroids. March 16 was given to the care of the collection and in the afternoon I had the pleasure of addressing the Horticultural Club of Trinidad and Tobago upon the object of our visit and the scope of our investigation. The meeting was held in the Royal Victoria Institute under the Chairmanship of Rev. Archdeacon Arthur Hombersley; His Excellency Sir John Chancellor, Governor of Trinidad, and Lady Chancellor honored us by their attendance, and the Governor made many kind remarks of appreciation; to him and to many other Trinidad officials we are deeply grateful for cordial coöperation.

On March 17, we made collections on the Heights of St. Ann, above Port of Spain. One of the several bracken savannas existing on these hills was studied with interest, the vegetation consisting almost wholly of the tall fern *Pteris caudata*, but a number of herbaceous plants and small trees were observed nearby, as also the curious 3-winged woody fruit of the long vine *Hippocratea*; the tree *Oliganthes*, related to *Vernonia* and reaching 50 feet in height with a trunk up to a foot in diameter, is one of the largest plants of the Composite Family.

On March 18, we traversed another section of the Piarco Savanna and also studied the woods to the south of it near the Caroni River, reaching the region by way of Dabadie. Numerous herbaceous species not seen on our previous visit were collected, among them the small endemic *Lobelia trinitensis*; several *Clusias* and related trees were seen here, one of them with pure white flowers three inches wide and very beautiful among the dark

green foliage; in a shaded brook we found a white-flowered floating-heart (*Nymphodes*) and a purple-flowered *Cabomba*; one of the native passion-flower vines bore yellow fruits the size and shape of a hen's egg. Through arrangements kindly made by Mr. Louis Scheult, Manager of the River Estate, we visited North Post, a hill about 600 feet high on the northern coast, on March 19; the signal station for incoming ships is situated here and fine views are had in all directions. Collections were made on hillsides along the road; trees of *Lecythis*, their small fruits like those of the related Brazil-nut, are frequent here, and one of the several kinds of wild figs (*Ficus*), here forest trees, was in full fruit. Coastal hills and marshes at Point Cumana, Carenage and Chaguaramas were studied on March 20. The coastal aroid *Montrichardia aculeata*, a species with an erect more or less prickly stem four or five feet high was found in fruit at Point Cumana and the tree *Mayepaea* of the Olive Family was abundant on dry hills near Chaguaramas. On March 21, we returned to the woodlands near the Caroni River, following the Caroni North Bank Road, and obtained specimens of many plants, mostly cryptogams. A somewhat arduous tramp of some eight miles was taken on March 22, from the North Post Signal Station westward, up and down hill to Maqueripe, but the botanical results were worth the effort, specimens of some seventy species being collected. Climbing to 600 feet elevation at North Post we went down hill to about 200 feet, then up to about 900, down again to sea-level, up to 1,000 feet and down to Maqueripe Bay. Most of the way was through cocoa plantations, but some fine forest areas were traversed; on the hill above Maqueripe we found the beautiful delicate white-flowered fragrant vine *Emmeorhiza* of the Madder Family and the leafless yellow *Leiphaimos trinitensis*, endemic in Trinidad, was collected in leaf-mould of the forest.

Through arrangements made by Mr. Freeman we visited the Government Farm at St. Augustine on March 23 and made collections of many herbaceous plants on marshy land given over to rice cultivation nearby. We were hospitably entertained there by Mr. J. McInroy, Superintendent of the farm, and Mrs.

McInroy. Mr. Broadway guided us the next day to the grassy savanna on the steep hills above St. Joseph, which we climbed up to 1,000 feet. A fruiting tree of *Roupala montana*, the only West Indian representative of the Protea Family, greatly interested us and several herbaceous plants not seen elsewhere were collected. The forest region about Valencia was visited on March 25; here we first saw the Trinidad *Clethra*, a tree up to at least 30 feet in height, and the purple-heart (*Peltogyne*), a very large and valuable forest tree. Three large palms are here luxuriant and abundant, cocorite (*Maximiliana*), timite (*Manicaria*), and palma real (*Oenocarpus*); museum specimens of their fruits were obtained.

From March 26 to March 30, our base was changed to San Fernando, forty miles south of Port of Spain by road, where permission to use the comfortable government building Colony House had kindly been granted us by Hon. T. A. V. Best, Colonial Secretary. The isolated, wooded San Fernando Hill gave us our first acquaintance with the tall palm *Sabal mauritiiiformis*, a relative of the Florida palmetto, its large leaves glaucous beneath, and there is here an outlying colony of the large *Cereus hexagonus*. The vegetation of the borders of the wonderful Pitch Lake near La Brea was studied with great interest and specimens of all kinds of plants found there were collected; no species characteristic of the environment were detected, nor have any ever been recorded; the large sedge *Cyperus ligularis*, ordinarily restricted to saline soil, occurs abundantly, however. Under the guidance of Mr. Freeman, studies and collections were made on March 28 in forest areas on the Penal Rock Road west of the Moruga Road, where the large palm *Attalea* grows abundantly, and near the eastern end of the Southern Watershed Reserve, where many cryptogams were obtained; the jigger-tree (*Bravasia*) was in full flower there. We are indebted to Mr. Henry Warner, President of the Agricultural Society, for information and hospitality and for specimens of the red-flowered banana (*Musa coccinea*) grown on his estate on the Moruga Road, its small fruits producing perfect seeds.

The low level lands of the Oropuche Lagoon, dry at this time

of year, were studied on March 29, yielding many kinds of sedges and grasses; the tall *Thalia geniculata* reminded us of Florida. We were delightfully entertained at the large sugar estate Usine St. Madeleine by Mr. Moody Stewart and his family. Under the guidance of Mr. C. B. Williams, Special Investigator of sugar-cane diseases, an excursion was made on March 30 to Palo Seco on the southern coast, where, among many other interesting trees and shrubs, the *Coccothrinax* palm was found in great abundance on hillsides facing the sea, its dense bunches of small black fruits very characteristic. One of the "mud-volcanos" was visited, and the great amount of earth which had flowed from it, covering the whole floor of a broad valley extending to the sea, was very impressive. We had previously studied a much smaller one near the Penal Rock Road.

Mr. Williams guided us also to a large quarry near Siparia, the rock excavated being widely used for road-metal; it is the argillaceous shale porcelainite, quite hard, and contains enormous quantities of fossil leaf impressions and other plant remains. This plant bed is of great extent and thickness; it is exposed in this quarry to a depth of at least sixty feet and is packed with leaf-impressions nearly throughout. Here must certainly exist the key to the ancestry of a large part of the Trinidad flora and the palaeontological information to be obtained from an intensive study of the fossils would be of high scientific importance. We collected some specimens, but much more time than was at our disposal would be required to obtain a satisfactory representation of the material.

Returning to Port of Spain, our next extensive collecting was accomplished on April 1, in the Caura River Valley, which yielded many mosses and lichens, and on the beautiful Arcadia Estate of Mr. Robert Henderson at Veronica, where we were cordially received and guided by Mr. F. C. Buthn, Manager, after introduction by Mr. F. W. Urich, Entomologist of the Board of Agriculture. Wooded hillsides there contain many interesting trees and shrubs; the lovely white flowers of *Samyda* were here first seen by us and the flat-stemmed cactus *Epiphyllum Hookeri* was in bloom, forming large masses on trees; charming mountain

views are had from the higher elevations. Mr. Buttn kindly granted our request for aid in the exploration of Mount Tocuche by furnishing men and mules and our ascent of this mountain, a Mecca for all naturalists visiting Trinidad, was organized for the morning of April 3, some of the party proceeding from Arcadia others from Ortinola, where similar cordial coöperation had been granted by Mr. J. P. Bain. Mr. Freeman, who was well acquainted with the route, led the Ortinola contingent, and brought two men from the Botanical Garden as general helpers.

Mount Tocuche is situated in the Northern Mountain Range Reserve north of the Maracas Valley and about three miles from the northern coast at Las Cuevas Bay. It rises to about 3,100 feet altitude, with very steep slopes. Cocoa plantations extend to about one half way up, but above them is unbroken forest of great beauty and of extreme interest. The ascent from the Caura Valley is over the well-graded Tocuche Bridle Road, about twelve and one half miles, which was reduced from Arcadia by short and steep cut-offs to about nine miles. From Ortinola the distance is not more than six miles, but part of it is too steep for animals to traverse. The two divisions of our party came together on the Tocuche Road about three miles from the summit, after a large fallen tree had been cut from across the road, causing some delay. There are several waterfalls in valleys near this point, the surrounding vegetation forming attractive natural gardens. Collections of many kinds of plants were made along the route travelled and the summit was reached about the middle of the afternoon. There is a small two-roomed government rest-house on the top, and the forest has been cleared off immediately around it, long-distance views thus being had in all directions. Its furniture comprises tables and benches only, but Mr. Freeman had brought camp-beds for the ladies, while the male contingent slept on floor-beds based on *Hemitelia* and *Dicranopteris* ferns, or on the benches; the relative hardness of ferns and benches was not determined, but everybody claimed to have slept well during the two nights of occupancy, disturbed only by the strong trade-wind which blew almost continuously. The temperature fell rapidly immediately after

sunset, reaching about 60° F. during the night, but we were prepared for this, and the whole experience was thoroughly enjoyed; no rain fell during the three days, which was pronounced unusual by those who knew the mountain. The flora is very rich and varied; we collected specimens of about 300 species, including trees, shrubs, herbaceous plants, ferns, mosses and lower cryptogams. Ferns are very abundant, from delicate filmies, of which fifteen kinds were obtained, to large tree-ferns of half a dozen species. The curious mountain representative of the Bladderwort Family (*Arcylium*) strikingly simulating a ground orchid, is locally plentiful on wet banks; a delicate blue-flowered little *Burmattia*-relative inhabits leaf-mould; a slender climbing bamboo-grass (*Arthrostylidium*) ascends trees; scarlet-flowered and white-flowered vines of the Heath Family are present in three species; a high-climbing *Senecio* bears showy yellow flowers; many orchids and bromeliads are perched on trees and rocks; the vine *Marcgravia elegans* festoons the trees, as also the climbing *Begonia scandens*, while a large white-flowered *Begonia* is abundant on banks and cliffs. We returned to Port of Spain richly laden and the care of the large collections made required two full days.

On April 7, Mr. Broadway accompanied us to the O'Meara Savanna south of Arima, where additional savanna herbaceous species were obtained and the smaller climbing palm *Desmoncus* was found growing on cocorite palms. We collected a few specimens the next day on the Caura Valley Road. On April 9, we went to Maraval and up the Morne Cocoa Road. On April 10, we visited the justly celebrated Maracas Waterfall, guided by Mr. C. B. Williams and Miss Nettie Bain; this is certainly a remarkable and beautiful cascade, a small river falling over vertical cliffs from a great height, said to be about 400 feet, ending in spray which moistens the vegetation over a considerable area. Here we made a large collection, including many ferns and mosses. A species of *Tabernaemontana*, a shrub of the Dogbane Family, bore interesting white flowers, their corolla-lobes arching upward and connivent, instead of widely spreading as in most species; a tree-*Solanum* there is an

unusual development in its family and the rocks and banks are carpeted with a trailing *Hydrocotyle*, one of the very few plants of the Carrot Family native in Trinidad; the cliffs are clothed with the large white-flowered *Begonia*, a large bromeliad with tall red branching inflorescence, and other plants.

A second visit was made to the Bocas Islands and the adjacent Trinidad mainland April 12 to 14, again using the launch "Marie" for transportation and the hotel on Gasparee Island as a base. This trip was especially planned for a further study of the cacti, and additional miscellaneous collections were made at Scotland Bay, Monos, Gasparee and Chacachacare Islands and at Bellevue. On Chacachacare we walked up to the lighthouse situated at over 900 feet elevation; *Steripoma*, a tree of the Caper Family, was conspicuous on the hillsides by its orange flowers. At La Tinta Bay, where we were hospitably received by Captain Mendes, we collected *Sophora tomentosa*, a seaside shrub of the Pea Family, a common West Indian species, known only at this point in Trinidad. Captain Mendes guided us to a wonderful colony of a *Sargassum*, the plants all firmly attached to the rocky bottom of a pool and very different from the pelagic species of the open ocean. At Bellevue the cochineal cactus (*Nopalea*) was found in abundance, forming thickets on a dry coastal hillside, an unusual habit for the plant to assume; it is usually seen singly or few together near houses where it has been planted. As one of the long-cultivated plants whose natural habitat is unknown, this occurrence is of considerable interest, but we could not satisfy ourselves that the plant is native here, as we saw ruins of a house nearby.

Collections were made in the Dibe Valley on April 15, including the golden yellow flowers of the *Tabebuia* trees, elegant and conspicuous on the hillsides, blooming before their palmately compound leaves appear; the bitter-wood (*Quassia amara*) is occasional here, its bright red, racemose flowers very attractive, and numerous ferns and mosses were obtained. The Valencia forests were again explored on April 16, at points on the Toco Road, and proved to be even richer in species, especially cryptogams, than our first examination of them had indicated; we

brought out specimens under 131 field numbers, and the day's work was one of the most interesting of the expedition. The elegant vine *Findlaya*, of the Heath Family, drooped in masses from the trees, its young foliage red, its flowers scarlet; the tree *Palidcourea* with large panicles of orange-yellow pedicels and white corollas was striking and attractive; an epiphytic *Columnnea* with yellow flowers hung from a tree; several of the numerous large parasitic plants of the Mistletoe Family were obtained, and a rare little *Schizaea* fern was detected in sandy woods, reminding us of our diminutive New Jersey curly grass, although three times as large.

The beautiful pool and cascade of Blue Basin and surroundings were visited from the River Estate on April 17, under guidance and hospitality of Mr. Louis Seheult and his family. Access is over a path rising several hundred feet and reaching wooded slopes in the northern mountain range; the vertical cliffs of the basin are clothed with ferns, begonias and mosses. The tall cannon-ball tree (*Couroupila*), much planted in the lowlands, grows wild on the hills; its hard globular fruits, up to six inches in diameter, borne after the large curious irregular flowers, on leafless branches from the lower part of the trunk, are internally malodorous; a fine example of one of the wild figs strangling a tree of another kind was seen along the path.

April 18 was given to a study of the vegetation of Mount Tamana, a steep-sloped isolated hill of hard limestone near the middle of the island, in a district of rather high rainfall. Its height is recorded as 1,100 feet; its summit and upper slopes are densely forested. Large incense trees (*Icica*) with fragrant wood and *Pterocarpus*, a tree of the Pea Family with flat, winged, one-seeded pods, are abundant; here is the type locality for the slender little palm *Geonoma vaga*, found both in flower and in fruit, and a pedate-leaved climbing aroid of the genus *Philodendron* is frequent, with several kinds of tree-climbing ferns. Cocoa plantations at the base of the mountain yielded many kinds of small epiphytic orchids, mosses and lichens.

Two days were now required for the care and packing of the

collections and for herbarium studies, and our final excursion was made with Mr. Freeman on April 21 to the Aripo Savanna, revisited in order to see the elusive *Schizaea pennula* and to find the fruit of the slender, white-spined, immoderately armed *Bactris* palm of that locality, both of which errands were successful, while other interesting species were also collected. We sailed from Port of Spain on April 23, touched at Grenada the next morning but without time to land, and arrived in New York, after a delightful voyage on the "Mayaro," on May 2. Our large collections of specimens and plants including 2,017 field numbers and aggregating over 6,000 specimens, together with some 2,000 others collected in former years by Mr. Broadway and several hundred duplicates obtained in exchange from the Department of Agriculture, and many algae collected by Professor Hazen were brought with us in good condition; Professor Hazen proceeded later by steamer to Europe, for algological studies during the summer.

The Department of Agriculture of Trinidad and Tobago has its head office and herbarium at the St. Clair Experiment Station close to the beautiful botanical gardens facing the Queen's Park Savanna at Port of Spain, also under its management. The gardens are rich in species of tropical plants, the large collection of palms being especially noteworthy; they date from the year 1818, and have been successively administered as a very important and useful horticultural and botanical institution by Daniel Lockhart (1818-1846), William Purdie (1846-1857), Hermann Crueger (1857-1864), Henry Prestoe (1864-1886), John Hinchley Hart (1887-1911) and since 1912 by William George Freeman, the present Director of Agriculture. The publications of the gardens and of the Department are extensive and valuable; our series of them was quite incomplete, but I obtained many of the parts missing in our library in exchange for parts of our *Bulletin* and our JOURNAL lacking in Trinidad. The herbarium of the Department is the largest and most valuable collection of its kind in tropical America, and is in an excellent condition of preservation, thanks largely to the unremitting care of Miss

Pauline McClean, who has been herbarium assistant for over thirty-two years.

Respectfully submitted,

N. L. BRITTON,
Director-in-Chief.

SUMMER LECTURES, 1920

Free Public Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, Saturday afternoons, at four o'clock, as follows:

July 3. "A Brief Description of the New York Botanical Garden," by Dr. W. A. Merrill.

July 10. "Summer Wild Flowers," by Dr. N. L. Britton.

July 17. "Spoilage of Fruits and Vegetables During Transportation and Storage," by F. C. Meier.

(Exhibition of colored photographs illustrating market diseases.)

July 24. "The State Park at Devil's Lake, Wisconsin," by Dr. A. B. Stout.

July 31. "Flowers for the Summer Garden," by Mr. G. V. Nash.

Aug. 7. "Diatoms—Plants of Beauty Seen Through a Microscope," by Dr. M. A. Howe.

Aug. 14. "Through the Philippines with a Kodak," by Dr. H. A. Gleason.

Aug. 21. "How to Know, Gather, and Cook the Puffballs," by Dr. W. A. Merrill.

(Exhibition of Gladioli, August 21 and 22.)

Aug. 28. "A Trip to Colorado," by Dr. F. J. Seaver.

The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. Doors closed at 4:00; late-comers admitted at 4:15.

HARDY WOODY PLANTS IN THE NEW YORK BOTANICAL GARDEN

(Concluded)

- Lonicera dioica.** GLAUCCUS HONEYSUCKLE.
Location: Viticetum.
Natural distribution: Northeastern North America.
- Lonicera flava.** YELLOW HONEYSUCKLE.
Location: Viticetum.
Natural distribution: Southeastern United States.
- Lonicera fragrantissima.** FRAGRANT HONEYSUCKLE.
Location: Fruticetum.
Natural distribution: China.
- Lonicera gracilipes** var. **glabra.** ONE-FLOWERED HONEYSUCKLE.
Location: Fruticetum.
Natural distribution: Japan.
- Lonicera iberica.** IBERIAN HONEYSUCKLE.
Location: Fruticetum.
Natural distribution: Transcaucasia and Persia.
- Lonicera japonica.** JAPANESE HONEYSUCKLE.
Location: Viticetum.
Natural distribution: China and Japan.
- Lonicera japonica** var. **Halliana.** HALL'S JAPANESE HONEYSUCKLE.
Location: Viticetum.
- Lonicera japonica** var. **flexuosa aureo-reticulata.** GOLDEN-VEINED HONEYSUCKLE.
Location: Fruticetum.
- Lonicera Koralkovii** var. **floribunda.** KORALKOW'S MANY-FLOWERED HONEYSUCKLE.
Location: Fruticetum.
Natural distribution: Turkestan.
- Lonicera Maackii.** MAACK'S HONEYSUCKLE.
Location: Fruticetum.
Natural distribution: Northeastern Asia to central Japan.
- Lonicera Maackii** var. **erubescens.** MAACK'S PINK-FLOWERED HONEYSUCKLE.

Location: Fruticetum.

Lonicera Maximowiczii. MAXIMOWICZ'S HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Northeastern Asia.

Lonicera minutiflora. SMALL-FLOWERED HONEYSUCKLE.

Location: Fruticetum.

Horticultural origin.

Lonicera Morrowi. MORROW'S HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Japan.

Lonicera Morrowi var. **xanthocarpa.** MORROW'S YELLOW-FRUITED HONEYSUCKLE.

Location: Fruticetum.

Lonicera muendeniensis. MUENDEN HONEYSUCKLE.

Location: Fruticetum.

Horticultural origin.

Lonicera muscaviensis. MUSKAU HONEYSUCKLE.

Location: Fruticetum.

Horticultural origin.

Lonicera Periclymenum var. **belgica.** BELGIAN WOODBINE.

Location: Fruticetum.

Natural distribution: Europe.

Lonicera Ruprechtiana. RUPRECHT'S HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Manchuria.

Lonicera segreziensis. SEGREZ HONEYSUCKLE.

Location: Fruticetum.

Horticultural origin.

Lonicera Standishii. STANDISH'S HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: China.

Lonicera Standishii var. **lancifolia.** STANDISH'S NARROW-LEAVED HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Western China.

Lonicera Sullivantii. SULLIVANT'S HONEYSUCKLE.

Location: Viticetum.

Natural distribution: Northeastern United States and Ontario.
Lonicera syringantha. LILAC-FLOWERED HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Western China.

Lonicera syringantha var. **Wolfii.** WOLF'S LILAC-FLOWERED
 HONEYSUCKLE.

Location: Fruticetum.

Lonicera tatarica. SIBERIAN HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Southeastern Russia to Siberia.

Lonicera tatarica var. **speciosa.** PINK-FLOWERED SIBERIAN
 HONEYSUCKLE.

Location: Fruticetum.

Horticultural origin.

Lonicera xylosteoides. BLUISH HONEYSUCKLE.

Location: Fruticetum.

Hybrid.

Lonicera Xylosteum. FLY HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Europe and western and northern Asia.

Diervilla. BUSH HONEYSUCKLE

Diervilla Diervilla. BUSH HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Northeastern North America.

Diervilla rivularis. HAIRY BUSH HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Diervilla sessilifolia. SESSILE-LEAVED BUSH HONEYSUCKLE.

Location: Fruticetum.

Natural distribution: Southeastern United States.

Weigela. WEIGELA

Weigela coraeënsis. COREAN WEIGELA.

Location: Fruticetum.

Natural distribution: Japan.

- Weigela floribunda.** MANY-FLOWERED WEIGELA.
 Location: Fruticetum.
 Natural distribution: Japan.
- Weigela florida.** ROSE WEIGELA.
 Location: Fruticetum.
 Natural distribution: Northern China.
- Weigela florida var. candida.** WHITE CHINESE WEIGELA.
 Location: Fruticetum.
- Weigela hybrida var. Abel Carriere.** WEIGELA ABEL CARRIERE.
 Location: Fruticetum.
 Hybrid.
- Weigela hybrida var. Avalanche.** WEIGELA AVALANCHE.
 Location: Fruticetum.
- Weigela hybrida var. Avant Large.** WEIGELA AVANT LARGE.
 Location: Fruticetum.
- Weigela hybrida var. Bouquet Rose.** WEIGELA BOUQUET ROSE.
 Location: Fruticetum.
- Weigela hybrida var. Buisson Fleur.** WIEGELA BUISSON FLEUR.
 Location: Fruticetum.
- Weigela hybrida var. candida.** WHITE HYBRID WEIGELA.
 Location: Fruticetum.
- Weigela hybrida var. Conquete.** WEIGELA CONQUETE.
 Location: Fruticetum.
- Weigela hybrida var. Dame Blanche.** WEIGELA DAME BLANCHE
 Location: Fruticetum.
- Weigela hybrida var. Desboisii.** DESBOIS' WEIGELA.
 Location: Fruticetum.
- Weigela hybrida var. Esperance.** WEIGELA ESPERANCE.
 Location: Fruticetum.
- Weigela hybrida var. Eva Rathke.** WEIGELA EVA RATHKE.
 Location: Fruticetum.
- Weigela hybrida var. Fleur de Mai.** WEIGELA FLEUR DE MAI.
 Location: Fruticetum.
- Weigela hybrida var. Floreal.** WEIGELA FLOREAL.
 Location: Fruticetum.
- Weigela hybrida var. Fraicheur.** WEIGELA FRAICHEUR.
 Location: Fruticetum.

- Weigela hybrida** var. **Glorieux.** WEIGELA GLORIEUX.
Location: Fruticetum.
- Weigela hybrida** var. **Gracieux.** WEIGELA GRACIEUX.
Location: Fruticetum.
- Weigela hybrida** var. **Gustave Mallet.** MALLET'S WEIGELA.
Location: Fruticetum.
- Weigela hybrida** var. **Herione.** WEIGELA HERIONE.
Location: Fruticetum.
- Weigela hybrida** var. **Isoline.** WEIGELA ISOLINE.
Location: Fruticetum.
- Weigela hybrida** var. **Lavallei.** LAVALLE'S WEIGELA.
Location: Fruticetum.
- Weigela hybrida** var. **Le Printemps.** WEIGELA LE PRINTEMPS.
Location: Fruticetum.
- Weigela hybrida** var. **Messenger.** WEIGELA MESSENGER.
Location: Fruticetum.
- Weigela hybrida** var. **Perle.** WEIGELA PERLE.
Location: Fruticetum.
- Weigela hybrida** var. **Seduction.** WEIGELA SEDUCTION.
Location: Fruticetum.
- Weigela hybrida** var. **Sieboldii argenteo-variegata.** SILVER-MARGINED WEIGELA.
Location: Fruticetum.
- Weigela hybrida** var. **Stelzneri.** STELZNER'S WEIGELA.
Location: Fruticetum.
- Weigela hybrida** var. **Van Houttei.** VAN HOUTTE'S WEIGELA.
Location: Fruticetum.
- Weigela hybrida** var. **Vestale.** WEIGELA VESTALE.
Location: Fruticetum.
- Weigela japonica.** JAPANESE WEIGELA.
Location: Fruticetum.
Natural distribution: Japan and China.
- Weigela japonica** var. **hortensis.** GARDEN WEIGELA.
Location: Fruticetum.

CARDUACEAE. Thistle Family

Baccharis. PENCIL-TREE**Baccharis halimifolia.** PENCIL-TREE.

Location: Fruticetum.

Natural distribution: Southeastern United States.

GEORGE V. NASH.

NOTES, NEWS AND COMMENT

Dr. Perley Spaulding, of the United States Department of Agriculture, spent two days at the Garden in May examining literature in the Garden library.

Prof. H. M. Fitzpatrick, of Cornell University, visited the Garden for several days in May in continuation of his work on pyrenomycetous fungi.

A series of Sunday afternoon lectures was initiated at the Garden, April 18, as already announced in the JOURNAL. They have been well received by the Garden visitors and have attracted good audiences.

Dr. John Hendley Barnhart, Bibliographer, has returned from a vacation in Florida, following a short time spent in research at the National Herbarium, Washington, D. C., for North American Flora.

Mr. Walter B. Balch, assistant in the instruction of convalescent soldiers, resigned his position May 31 to enter private commercial work. During the spring, in addition to his other duties, Mr. Balch had been in charge of the rose garden.

Dr. J. K. Small, Head Curator, returned early in May from another successful collecting trip in Florida. One of the most interesting events of the expedition was the rediscovery of *Rhododendron Chapmanii* near Apalachicola, where it was originally collected by Chapman eighty years ago.

Dr. Fred J. Seaver, Curator, spent some time in Washington early in May examining collections of certain microscopic fungi preparatory to his publication of the genus *Phyllosticta* in North American Flora. This genus of parasitic fungi is represented by more than 300 species in North America.

The most attractive display at the Garden during May was the collection of Darwin, Breeder, and Cottage tulips, presented by John Scheepers, Inc., and including almost 10,000 plants in over a hundred varieties. The collection occupied the beds of the conservatory court, and attracted thousands of visitors.

Dr. Francis W. Pennell, Associate Curator, returned June 6 from a six-weeks trip into the southwestern states, in search of early flowering members of the family Scrophulariaceae. He collected in Georgia, Louisiana, Texas, Oklahoma, Arkansas, and Kentucky and made a number of interesting and important discoveries.

Meteorology for April.—The total rainfall for the month was 4.23 inches. The maximum temperatures recorded at the Garden for each week were 64° on the 3d, 58° on the 11th, 66° on the 18th, 77° on the 22d, and 71° on the 30th. The minimum temperatures were 24° on the 10th, 33° on the 14th, 35° on the 25th and 38° on the 28th.

Grading and path-making for the new iris garden in the horticultural grounds were begun in April and have been carried on steadily whenever the weather has permitted, following plans prepared by Mr. John R. Brinley, landscape architect. A considerable portion of the area intended for iris will be ready for planting in July and will be occupied by the test garden established in coöperation with the American Iris Society.

The annual spring inspection was held May 6. The weather was perfect, in marked contrast with 1919, and the number of visitors correspondingly large. The party visited in turn Con-

servatory Range 1, the horticultural grounds, conservatory range 2, and the cherry garden, and spent the remainder of the time in the Museum building. Short talks were given during the afternoon by Dr. N. L. Britton, Dr. H. A. Gleason, and Mr. John R. Brinley.

The North Country Garden Club, presided over this year by Mrs. Beekman Winthrop, of Westbury, Long Island, made a field-day excursion to the New York Botanical Garden on the afternoon of Wednesday, May 19. The splendid collection of tulips in the conservatory court, containing about 10,000 plants representing 117 varieties; the new iris garden under construction; the central display greenhouse recently completed; the Japanese flowering cherries; and other special features were examined by the members with much interest.

While the outdoor plantations have suffered from an unusual winter, the greenhouse plants have prospered remarkably during the winter and spring. The occupation and enlargement of conservatory range 2 has provided the necessary space and relieved the crowded condition of last year, while a better supply of coal has kept both ranges at a more favorable temperature. The new concrete tanks in the propagating house have proved successful and have been used for starting a supply of tender water lilies, which will later be set out in the large tanks of the conservatory court.

Specimens of two noteworthy plants have been added to the conservatories from Dr. Small's Florida collections. The one is a century plant, *Agave neglecta*, heretofore not in our collections, the other the silver-palm, *Coccothrinax argentea*. The century plant is a local species, but is much cultivated for ornament in tropical Florida. The specimens of the palm are particularly interesting. They were found over one hundred miles north of the former known center of distribution of the species in Florida, and are evidently derived directly from seeds carried of and sown by migratory birds during their northward flight.

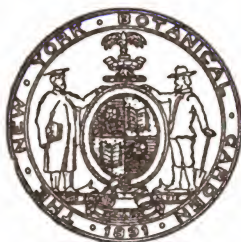
The Nature Committee of the Good-Citizenship League Flushing, Long Island, consisting of about twenty ladies, arrived at the Garden May 17 at ten-thirty o'clock and remained all day. Beginning at the museum building, they first examined the exhibits of cork, paper, rubber, logwood, fruits, vegetables, drugs, woods, and other plant products on the main floor, after which they visited the collection of fossils, the museum of systematic botany, and the library and herbarium. At conservatory range 1, they were particularly interested in the fine display of tulips in full flower in the conservatory court. From the herbaceous grounds, they passed into the hemlock grove for a study of the principal trees, and then took luncheon at the Mansion. The afternoon was devoted to the rose garden, the vegetable garden, the propagating houses and out-door beds, the Japanese cherry orchard, the beech grove by the river, and the plantations about the lakes north of the museum building.

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EDITOR

H. A. GLEASON

Assistant Director



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Georgetown: an avenue of Saman trees (*Samanea Saman*), a beautiful round-topped shade tree much used along the streets and common in tropical cities, often called Rain tree and Monkey-pod.

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REPORT ON A RECENT TRIP TO BRITISH GUIANA

(WITH PLATES 248 AND 249)

The trip to British Guiana was made through the coöperation of the New York Botanical Garden, the Gray Herbarium and the United States Department of Agriculture.

Accompanied by Mrs. Hitchcock, I left New York, October 4, 1919, on the steamer "Korona" of the Quebec Line, arriving at Georgetown October 22. On the way we went "down the Islands," that is, we made stops at several of the smaller West Indian Islands from St. Thomas to Barbados. These stops enabled me to make collections of the grasses, though the short time and the limited facilities for drying specimens did not permit the collection of other families of plants. The collections of grasses were as follows:

St. Thomas, October 11, nos. 16294 to 16320

St. Croix, October 12, nos. 16321 to 16348

St. Kitts, October 13, nos. 16349 to 16371

Antigua, October 14, nos. 16372 to 16397

Guadeloupe, October 15, nos. 16398 to 16414

Dominica, October 16, nos. 16415 to 16441

Martinique, October 17, nos. 16442 to 16469

St. Lucia, October 18, nos. 16470 to 16497

Barbados, October 19, nos. 16498 to 16525

The numbers from each island for the most part represent different species. The passage between the islands was usually

in the night, and the landing was made by small boats, except at St. Thomas and St. Lucia where the steamer comes to a wharf.

On these islands the irregular occurrence of introduced weedy grasses is of much interest. At St. Thomas, *Chloris paraguayensis* was very common, on many other islands it was infrequent, and at Georgetown was not observed at all. Why the distribution of this common tropical weed should be so erratic is not clear and it is especially puzzling why the species should be absent from Georgetown where the facilities for its introduction are ample. Many other common tropical weeds are absent from Georgetown. At St. Thomas was observed the form of *Panicum adspersum* with velvety spikelets. In our revision of *Panicum*¹ was mentioned the only specimen of this form that had come to our attention (Eggers in 1876, collected on St. Croix).

On St. Croix *Chloris radiata* was a common weed along with *C. paraguayensis* and, though not so common, *C. ciliata*. The most noticeable grass on the savannas or open dry pasture lands was *Andropogon pertusus panormitanus* (Parl.) Hack., called sour grass. The common name is somewhat confusing, as it is applied on other islands to *Valota insularis* (*Panicum leucophaeum*) and to *Paspalum conjugatum*.

Two species of *Andropogon* (*A. bicornis* and *A. glomeratus*), both called foxtail, were frequent on the grassy slopes of St. Kitts, below the wet forest of the upper parts of the mountains.

On Antigua *Chloris polydactylon* was seen in abundance in grassland, waste places, and among brush. This is the only island visited where this species was found, and since it is a perennial its presence as a weed was especially surprising.

Two interesting species were found on Guadeloupe in the low marshy land near the sea. One, *Eragrostis prolifera*, was probably growing in its type locality. As stated in another place,² the species was originally described by Swartz from "Insulae caribaeae," but in a later work the same author gives

¹ Contr. U. S. Nat. Herb. 15: 43. 1910.

² Grasses of the West Indies, Contr. U. S. Nat. Herb. 18: 392. 1917.

as the localities, "Lucia, Guadeloupe." In the "Grasses of the West Indies" it was stated that *Eragrostis prolifera* was abundant on the sand spit at Cartagena, Colombia. Having seen both these forms growing, I think they represent distinct species. The second interesting grass was *Echinochloa pyramidalis*, originally described from Senegal. On Guadeloupe it is gregarious over a large area, growing to the height of six to eight feet.

On Dominica there is a very creditable Botanical Garden in charge of Mr. Joseph Jones. The location of the Garden is unusually fine, being in a kind of amphitheater backed by a steep mountain.

The only grasses of interest found on Martinique were *Ischaemum latifolium* and *Sporobolus muralis*. The former appeared to be introduced, though Guadeloupe and Martinique were the localities mentioned with the original description. *Sporobolus muralis* also appears to be a weed, probably introduced from Brazil.

Our steamer stopped at St. Lucia only two hours, about an hour of which I was able to spend on shore. Though the time was short I collected 27 species of grasses.

Barbados is so completely given over to cultivation that little of the original flora has survived. One finds some of the native plants along rocky slopes or bluffs that are unsuited to cultivation. Here were found the grasses *Chloris orthoton* and *Pennisetum setosum*. An interesting case of erratic weed distribution was found here, that of *Brachiaria erucaeformis* (*Panicum erucaeforme*). In our account of the Grasses of the West Indies¹ this species was mentioned in a note but was not admitted formally to the list, as there was but a single specimen in the U. S. National Herbarium (Botanic Station Herbarium 448). I found it to be a common weed in fields on the island.

A similar case was presented by *Panicum trigonum* in Trinidad, where I stopped on the return trip. In the account of the West Indian grasses this species is mentioned without formal standing in the list because we supposed our single specimen to be a waif

¹ Contr. U. S. Nat. Herb. 18: 299. 1917.

and that the species was not established. To my surprise it was abundant in certain places in the Botanical Garden. On my previous visit to the island in 1911 I had not observed the species.

On arriving at Georgetown I at once called on Professor J. B. Harrison, the Director of Science and Agriculture. Professor Harrison took great interest in my proposed work and extended many courtesies during my visit to the Colony. Very efficient aid was also given me by Mr. Bodkin, Assistant Director of Science and Agriculture, and by Mr. Ward, Superintendent of the Botanical Garden.

For about six weeks I studied the flora in the region accessible from Georgetown. By means of a railway I was able to go as far as Parika in the west and New Amsterdam in the east. I arrived in the midst of an unusually dry season and was in consequence somewhat hampered in collecting.

The coastal area for many miles back from the sea is a level alluvial plain. The streets of Georgetown are below the level of high tide and the sea is excluded by dikes and a strong sea wall. There are many streams, canals, and marshes that harbor water plants in great profusion. Through the courtesy of the officials I was able to spend five days on the East Coast Water Conservancy. This is a diked area of many square miles that by means of canals supplies Georgetown and the plantations with water (drinking water is supplied from tanks receiving roof drainage).

On December 2 we went to the Penal Settlement, where we remained for three weeks at Colony House. The Penal Settlement is favorably located on rising ground nearly opposite Bartica at the mouth of the Mazaruni River, about 30 miles up the Essequibo River. It is near here that Professor Beebe has his laboratory. The original laboratory was at Kalacoon opposite the Penal Settlement; the present laboratory is at Kartabo, about three miles above the settlement at the mouth of the Cuyuni River, and near Kyk-over-al, an island upon which are the ruins of the first Dutch settlement. The Penal Settlement is reached by steamer three times each week from Georgetown,



FIG. 1. Entrance to the Botanical Garden, Georgetown. The collection is rich in species of palms.



FIG. 2. Dr. Hitchcock's headquarters in Georgetown. At the left and right are Flame trees (*Delonix regia*), also called Flamboyant. The small tree is Frangipani (*Plumeria*).

which is at the mouth of the Demerara River. One can go all the way by steamer or go by rail to Parika on the Essequibo River and transfer to the steamer.

The next trip was to the Potaro River (December 30 to January 12). Leaving Georgetown by steamer up the Demerara River, we transferred at Wismar to a railway which took us across to Rockstone on the Essequibo above the rapids which prevent navigation up this stream. The little railroad passes for twenty miles through a peculiar region, a white sand scrub, reminding one somewhat of the scrub land of Florida. The difference between the scrub and the usual wet forest is here very striking. In the scrub the vegetation consists of scattered shrubs and low trees among which one can walk unimpeded. The herbaceous plants are comparatively infrequent and inconspicuous.

We remained two days at Rockstone, our domicile being a comfortable resthouse. A launch runs three times a week between Rockstone and Tumatumari, requiring about twelve to fifteen hours for the trip upstream. There is another resthouse at Tumatumari a few miles up the Potaro River, a tributary of the Essequibo. At this place we remained five days and found the situation and conditions very delightful. At the invitation of Mr. Percival, manager of a gold-dredging company, I visited his place further up the Potaro, going by launch to Potaro Landing and by horse-cart ten miles inland. The return journey to Georgetown was broken at Wismar and we went to Akyma and Mackenzie a short distance up the Demerara, at the invitation of Mr. Barnett, manager of the Demerara Bauxite Company. At Akyma there are extensive deposits of bauxite, an oxide of aluminum, and the company is making preparations on an elaborate scale for utilizing the mineral.

Immediately upon our return from the trip just mentioned I started for the Northwestern District, leaving Mrs. Hitchcock in Georgetown (January 13 to 22). A steamer leaves Georgetown once a week for Morawhanna on the Barima River in the extreme northwest corner of the Colony. As the trip is in the open ocean the passage is very rough. The steamer leaves Tuesday, arrives at Morawhanna Wednesday morning, departs from

there on Wednesday evening and arrives at Georgetown Thursday morning.

I spent two days with Mr. King, the Commissioner of the District, and then went to the Rubber Station at Issorora, a short distance up the Aruka River, where I staid two days at a resthouse with Mr. Dowding the Superintendent. Mr. Dowding arranged for a trip to Yarikita on the Venezuelan border which required three days. The passage was made in a large rowboat, covered amidships for the comfort of passengers. We passed up the Aruka and then up a branch stream, the Aruau, to its source. The first night was spent at an Indian benab on the upper part of the latter stream. The benab was a building with a board floor, open sides, and a thatched roof. In this space hammocks were slung and my folding cot placed. The following day we passed over a portage of about a mile to the source of the Yarikita River and down this river to its junction with the Amakura River, which forms the boundary between British Guiana and Venezuela. We arrived about noon and made our headquarters at the Yarikita Police Station where there is a small resthouse of two rooms for travelers. Of course, I had brought with me food and a bed. The best collecting was from the boat along the margin of the river where the forest overhangs the water. At one point we crossed the river and collected a few specimens from the Venezuelan side. I thus had the unique experience of collecting plants in Venezuela without ever having set foot on Venezuelan soil. We started on the return trip early in the morning and arrived at Issorora late the same evening. The following day we returned to Morawhanna and boarded the steamer for Georgetown. The remainder of my stay in Georgetown was occupied in arranging and packing my specimens and in examining the herbarium at the Botanical Garden.

The return to New York was by the steamer "Maraval" of the Trinidad Line, which stopped four days at Trinidad and a few hours at Grenada. We left Georgetown February 2 and arrived at New York February 16.

The following table indicates the collections obtained at points in British Guiana:

PLACE	DATE	FIELD NUMBERS
Georgetown.....	Oct. 24-Nov. 10	16526-16691
Vreed-en-Hoop.....	Nov. 10	16692-16721
Georgetown.....	Nov. 11	16722-16723
Vreed-en-Hoop.....	Nov. 12	16724-16741
Parika.....	Nov. 14	16742-16760
Mahaica.....	Nov. 15	16761-16789
Georgetown.....	Nov. 17	16790-17692
Parika.....	Nov. 19	16793-16817
New Amsterdam.....	Nov. 21	16818-16833
Georgetown.....	Dec. 26	16834-16840
Water Conservancy..	Nov. 25-28	16860-17027
Penal Settlement....	Dec. 3-8	17028-17161
Bartica.....	Dec. 9	17162-17163
Penal Settlement....	Dec. 9	17164-17172
Hills Estate.....	Dec. 10	17173-17195
Kartabo.....	Dec. 11	17196-17229
Penal Settlement....	Dec. 12	17230-17247
Bartica.....	Dec. 15	17248-17268
Kalacoon.....	Dec. 16	17269-17272
Wismar.....	Dec. 30	17273-17282
Rockstone	Dec. 31-Jan. 1	17283-17332
Tumatumari.....	Jan. 3-5	17333-17383
Potaro.....	Jan. 7-8	17384-17411
Rockstone.....	Jan. 8	17412
Akyma.....	Jan. 9-10	17413-17453
Mackenzie.....	Jan. 11	17454-17465
Morawhanna.....	Jan. 14	17469-17539
Issorora.....	Jan. 16-17	17540-17589
Portage.....	Jan. 19	17590-17601
Yarikita.....	Jan. 19	17602-17659
Georgetown.....	Jan. 25	17660.

The annual rainfall at Georgetown is about 90 inches, distributed somewhat vaguely into two wet and two dry seasons.

The mean monthly rainfall at that place (an average of 33 years, 1880 to 1912) is as follows:

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
8.36	6.78	7.49	7.25	11.50	12.06	10.61	6.31	3.01	2.35	5.26	11.46	91.23

In a moist climate like this the drying of botanical specimens is difficult. I will therefore explain somewhat at length the methods used. I took with me four slat presses, 500 sheets of standard driers, about 200 sheets of corrugated paper, and 8000 folded inner sheets. I also took a kerosene stove with wide flat wick such as is used for cooking, and purchased another in Georgetown. Kerosene oil can be obtained wherever civilization penetrates. The inner sheets were taken into the field in a collecting portfolio. The specimens were numbered and recorded in the usual way. Before leaving Washington my note books were numbered with an automatic numbering machine making three numbers to the page. This reduced to a minimum errors in numbering. The sheets of specimens in the folded inner sheets were placed in a press with single driers between and allowed to remain tightly strapped for twelve hours. The driers were then replaced by single sheets of corrugated paper and the straps drawn as tight as possible without crushing the corrugations. The press was then placed edgewise over an oil stove and a cloth draped around to act as a chimney so that heated air was forced through the press. Many plants will dry in 12 hours, most of them in 24 hours and the succulents in two to four days. The corrugations should run crosswise of the sheets and the press should be only about 12 to 15 inches thick. A second press can be suspended above the first to utilize waste heat. By running two stoves night and day I could handle all the plants I could collect. The object of placing the plants first in a tightly strapped press with driers was to flatten them out, otherwise they would crinkle in the corrugated boards. The wet driers are dried in the sun when possible but they can be used even when wet. When the dry specimens are taken from the press a small quantity of naphthalene is sprinkled in each sheet to prevent molding. The single-faced corrugated paper was preferred to the double faced and the sort with driers permanently attached as facing was found useless. The clothes racks much used in the Colony and built on the plan of an enlarged towel rack were found satisfactory for supporting the presses over the stoves.

At the Botanical Garden there is an excellent herbarium based upon Jenman's collection and called the Jenman Herbarium. Professor Harrison has indicated a willingness to place this herbarium at the disposal of taxonomic botanists and will probably lend to responsible investigators for study such genera or families as may be needed.

I had with me as a helper during my entire stay a young colored man, Edward Stewart, who accompanied me in the field, did my cooking when away from my base, and aided me in various ways.

It is to be regretted that I was unable to reach the more remote parts of the Colony, such as Roraima and the southern savanna region or Rupununi District, but the difficulty of travel prevented this. One must travel entirely by boat and the rivers are all much impeded by rapids and waterfalls. It would require special transportation arrangements and a minimum of about three weeks to reach the Rupununi District from Georgetown. It therefore seemed advisable to use my limited time in visiting the points accessible by regular transportation.

British Guiana has an area of about 90,000 square miles, is about 400 miles deep, and extends about 250 miles along the coast (lat. 1° – 8° , N.; long. 57° – 61° , W.). There are three counties: Demerara, including the drainage system of the Demerara River and to the Abary river on the east; Essequibo, including the drainage system of the Essequibo River and all to the west; and Berbice, including the drainage system of the Berbice River and east to the Courantyne River. Georgetown, at the mouth of the Demerara River, has a population of about 60,000. The only other city is New Amsterdam, at the mouth of the Berbice River, with a population of about 9000. The entire population of the Colony is about 300,000, about 4000 of whom are whites. The bulk of the population consists of East Indians (42.7 per cent.) and negroes (39. per cent). The chief product of the Colony is sugar, which, together with the by-products rum and molasses, constitutes about three fourths the exports. Other products are gold, rice, balata, timber, and cattle. The country is fairly healthy, the death rate being about 35 per 1,000 (14.8 per 1,000 among whites). Yellow fever is absent, but malaria and dysentery are prevalent.

A. S. HITCHCOCK

THE 1920 DAHLIA BORDER

The 1920 dahlia border, planted during the second week of June, gives promise of excelling the dahlia exhibits of the past two seasons in beauty and general interest. The planting, subject to slight changes owing to failures and replacements, includes nearly 500 varieties, represented by 732 individuals as compared with 343 varieties, represented by 607 individuals, of the last year's collection. The main border occupies the same position as during the past two seasons, with, however, an overflow annex of about 130 plants, including the singles, the collarettes, the pompons, the shows, and a few of other types, in the border at the south of the railway station plaza. There are twenty-seven contributors of roots and plants this season, as will be announced in more detail under head of Accessions, including most of the leading commercial growers and originators of dahlias in the United States. Among the new exhibitors are J. K. Alexander, East Bridgewater, Mass.; F. C. Burns, San Rafael, California; Frank D. Pelicano & Co. and R. McWhirter, San Francisco; Richard Vicent, Jr. & Sons, White Marsh, Md.; Mills & Co., Mamaroneck, N. Y.; N. Harold Cottam & Son, Wappingers Falls, N. Y.; and Mrs. Charles H. Stout, Short Hills, N. J. Among the old friends of the border, notable new contributions have been received from W. J. Matheson, Huntington, N. Y.; The Dahliadel Nurseries, Vineland, N. J.; J. J. Broomall, Eagle Rock, California; Emily Slocombe, New Haven, Conn.; Geo. L. Stillman, Westerly, R. I.; Alfred E. Doty, New Haven, Conn.; and C. Louis Alling, West Haven, Conn. Broomall, Slocombe, Alexander, Burns, the Dahliadel Nurseries, and others have sent their best novelties for 1920, and these are likely to prove a most valuable and interesting feature of this year's display, which promises to make a close approach to exhibiting the cream of the world's dahlias.

MARSHALL A. HOWE

NOTES, NEWS AND COMMENT

The following visiting botanists registered in the library during late April and May: Professors H. H. Whetzel, L. H. Bailey, and H. M. Fitzpatrick, Ithaca, N. Y., Mr. G. N. Hoffer, Lafayette, Ind., Professors Edith M. Twiss and Edith A. Roberts, Vassar College, Mr. W. B. Tisdale, Madison, Wis., Mr. Harry Lebau, Rutherford, N. J., Dr. Perley Spaulding and Messrs. Frederick V. Rand and W. W. Eggleston, Washington, D. C., and Mr. L. H. Knoche, San Jose, California.

Miss Elizabeth B. Higgins, Librarian at the Bernice Pauahi Bishop Museum, Honolulu, Hawaii, visited the library on May 4.

Dr. P. A. Rydberg spent several days during May at the Gray Herbarium of Harvard University in the preparation of manuscript for North American Flora.

Dr. F. W. Pennell returned to the Garden June 7, after a six weeks' collecting trip for plants of the Figwort and other families in the West Gulf States. An account of his trip will appear in a later number.

Miss Hester M. Rusk has been appointed Technical Assistant at the Garden, beginning July 1.

Mr. E. E. Watson, since January 1 assistant in gardening instruction, has been appointed instructor in botany at Rutgers College, and discontinued his work at the Garden July 15.

Dr. A. B. Stout visited the New York Experiment Station at Geneva during the middle of June, in continuation of his studies on sterility and fertility in grapes.

Dr. Fred J. Seaver spent several days at Pennsylvania State College on a mycological collecting trip in collaboration with Cornell University, Syracuse University, and Pennsylvania State College. A more complete report of this trip will be made at a later date.

The Wild Flower Preservation Society and the Torrey Botanical Club held a joint meeting at the Mansion June 2. The chief feature of the program was an address by Dr. Homer D. House, State Botanist, on "The Wild Flowers of New York." His remarks were illustrated by colored lantern slides and by plates from his new publication on the same subject.

The annual meeting of the Woman's National Farm and Garden Association was held in the Mansion of the New York Botanical Garden on May 25, Mrs. Francis King presiding. After the luncheon, at which Mrs. Charles D. Norton was hostess, a walk was taken through the hemlock grove and herbaceous valley to the tulip beds in the conservatory court. The weather was fine and the flowers in superb condition. A lecture by Professor L. H. Bailey, the distinguished horticulturist and agriculturist, on "Coöperation in Agriculture" concluded the program for the day. This association has increased rapidly in numerical strength and is becoming an important influence in bringing the producer and consumer together.

Dr. Frank S. Collins of North Eastham, Mass., one of the best-known writers on the American algae, died suddenly on May 25, in the 73d year of his age. Dr. Collins was a frequent visitor at the Garden, his last visit having been made only a few weeks before his death. His two most important works were "The Green Algae of North America," with its two supplements, and "The Algae of Bermuda," the latter in coöperation with Dr. A. B. Hervey. In association with Prof. W. A. Setchell and the late Isaac Hölden, he issued the *Phycotheca Boreali-Americana*, a collection of dried specimens, which in point of number of specimens distributed has had only one rival among the algae exsiccatae of the world. Dr. Collins contributed the account of the blue-green algae to Britton & Millspaugh's "Bahama Flora," now in press.

Construction work at the Garden during May and June included work on excavating, grading, and path-making in the new Iris Garden and the adjacent grounds, further work on the

Cherry Garden Shelter House, repairs to the brick pillars and retaining wall in front of the Museum, painting the boundary fence on Bronx Park East, and painting and repairs in Conservatory Range 1.

About 150 biology pupils from Washington Irving High School, accompanied by their teachers, spent the forenoon of June 15 at the Garden. They were first divided into groups and taken through the greenhouses, flower gardens and tree plantations by members of the staff; after which they heard a lecture on "Trees" and examined the museum collections.

About 400 biology pupils from Morris High School attended a lecture on "Trees" at the Garden at one o'clock on June 16, after which they studied various representative specimens on the grounds under the guidance of their own teachers and members of the Garden staff.

On June 17, biology pupils from Evander Childs High School visited the Garden for their regular greenhouse and museum exercises. The stormy weather reduced the attendance to about 115 and made it impossible to examine the herbaceous garden, but everything else went through according to the schedule prepared by Mr. Mann. An excellent lecture on "Forestry," given by Mr. George T. Hastings, was listened to with deep interest.

Meteorology for May.—The total precipitation for the month was 3.13 inches. The maximum temperatures recorded for each week were 72° on the 9th, 80° on the 10th, 81° on the 22d, and 83° on the 29th. The minimum temperatures were 36° on the 5th and on the 15th, 44½° on the 18th, and 48° on the 31st.

The rose garden, located just to the south of the Mansion on the eastern side of the Garden, bloomed freely during June. The flowers continued at their maximum quantity during June and early July; through the remainder of that month and in August there are but a scattering display; from September on to the time

of killing frosts the amount of bloom will again increase. The past winter was extremely severe on roses, hybrid teas suffering particularly. Even hybrid perpetual roses were killed almost to the ground, something which has not happened before in the history of the institution. The killing of the stems almost to the ground necessitated very severe pruning, the result being fewer but larger blooms. As has been the usual custom here, hybrid perpetual roses were not protected, but all others were mounded, that is, earth was piled around the stems to a height of eight or ten inches, this serving in previous years to protect them amply from the winter's cold; in some instances this protection was entirely inadequate the past winter.

Despite the backwardness of the season, the vegetable gardens of the students in gardening are now (June 30) doing extremely well. Several crops of lettuce, radishes, and spinach have been harvested, kohlrabi is coming on, tomatoes are setting fruit, and clean crisp Swiss chard is ready to cut. Lettuce has been very plentiful; the students have it in all corners, between cabbage and tomatoes, and between rows of other crops. Beans and peas are strong in foliage, and give promise of bearing many full pods. Especially noticeable is the robust growth and clean foliage of the cabbage and tomatoes. Some of the celery has been planted in double rows, water being furnished in surface irrigation between the rows. No serious pests or diseases have appeared, but the ground moles have tunneled passages under many fine plants.

A flower show was held June 12th and 13th in the Museum building, in coöperation with the Horticultural Society of New York. The schedule of prizes was mainly for roses and peonies, but owing to the unusual lateness of the season, few roses and peonies were exhibited. The show was held a week later than that of last June, and yet fewer flowers were available. The Garden made a large exhibit of irises and of the flowers of trees and shrubs.

ACCESSIONS

MUSEUMS AND HERBARIUM

- 40 colored lantern slides of wild flowers. (Prepared by Mr. L. W. Brownell.)
 24 specimens of flowering plants from Missouri. (Collected by Mr. B. F. Bush.)
 2 specimens of hepaticae from California. (Given by Mr. George M. Pendleton.)
 123 specimens "*Kryptogamae exsiccatae*" Century XXI. (For the Columbia University Herbarium.)
 1 specimen of *Daedalea confragosa* from Long Island, New York. (By exchange with Prof. A. H. Graves.)
 1 specimen of *Fomitiporia laminata* from New York. (By exchange with Dr. H. D. House.)
 1 specimen of *Fuscoporia viticola* from South Carolina. (By exchange with Dr. W. C. Coker.)
 1 specimen of *Crepidopus ostreatus* from California. (By exchange with Dr. A. S. Rhoads.)
 1 specimen of *Podaxon* from Cuba. (By exchange with Brother Hioram.)
 55 specimens of ascomycetous fungi mostly from New York. (By exchange with Dr. H. D. House.)
 1 specimen of *Gymnopilus Nashii* from Cuba. (By exchange with Brother Hioram.)
 75 specimens of rusts and smuts from the local flora range. (Collected by Mr. Percy Wilson.)
 * 1 specimen of *Lentinus crinitus* from Florida. (By exchange with Dr. M. S. Whetstone.)
 1 specimen of *Calostoma cinnabarinum* from Pennsylvania. (By exchange with Prof. J. F. Adams.)

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MAY 31, 1920.

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JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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THE PARAFFIN METHOD OF GRAFTING

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FURTHER REFLECTIONS OF AN ORCHID-HUNTER

How we should welcome a "Flora of Manhattan," of the year 1609! We can picture to ourselves the appearance of the island, when Hendrick Hudson and his companions first looked on it; but we very much want something more substantial than fancies or impressions. We want records and herbaria. It is not till some generations later that we begin to get them in America. In the days of Hudson and his adventurous rivals, exploring expeditions were not equipped for scientific pioneering. We are quite sure that there was no botanist on the "Half-Moon" when she came slowly up the bay. Our curiosity is piqued, but not satisfied by the pleasant statement of Washington Irving,¹ when he tells us that some of the abundant trees were "loaded with a verdant burthen of clambering vines, bowing their branches to the earth, that was covered with flowers." He specifies "the dogwood, the sumach and the wild brier, whose scarlet berries and white blossoms glowed brightly among the deep greens of the surrounding foliage." All of these beauties linger still within a few miles of the place where Hudson landed. The day was the third of September; so we can credit the dogwood berries and perhaps some late flowers of a *Rubus*; but we should like to know what were those other vines that, with tropical intensity, bowed the lofty trees; and we desire even more strongly to know

¹ Knickerbocker's New York, p. 90. Putnam ed. 1863.

the names of the scores of other plants that crowded the wooded hills of Manhattan on that distant day.

We shall never know; records are lacking; wishes and guesses do not take their place. The scientific imagination looks forward not backward; it develops theories and plans, not legends. These reflections are prompted by the conviction that our regrettable lack of definite knowledge of the plant life of Manhattan three hundred years ago should be a warning against present neglect. Throughout an area many times as great as the twenty-two square miles of Manhattan Island, species are disappearing or are waiting to be discovered. Unless botanists of the present generation are unremittingly active during the next few years, they will fail to secure some evidences of plant life and distribution which would be invaluable to their successors. In spite of all that has been done, much remains unattempted. No one can predict how important some facts, as yet undiscovered, may be. In spite of the admirable and intelligent, and profitable specializing in fields of botanical science that till recently had not been entered, it remains true that the base of all our investigations is the plants themselves; questions of ecology, association, soils, distribution, economic values, though immeasurably important, are secondary; the facts, of the presence and prevalence of species, come first. The structure of all botanical knowledge, whose apex reaches high, rests on quadrats!

These reflections are concerned with the orchid-flora and constitute a plea for prompt advance in thorough acquaintance with that, especially in the Eastern States. Similar considerations apply to all plant families, but not to all with quite the same urgency. For our native orchids are usually harder to find than most species of flowering plants and are also more exposed to spoliation, at the hands of over-enthusiastic collectors, or, in the vicinity of many cities, by the vandalism of children and excursionists. Hence the need for prompt and diligent search before some species are exterminated, and in order that others may be discovered, or at least detected in new places; so as to provide the material for thorough study, comparison, inference and record.

This plea for prompt and vigorous activity in extended investigation of our native orchids may be urged on three grounds.

1. First, the fact that the orchid flora is not yet fully known. We have been beguiled into unwarranted complacency by the present extent of our knowledge, which is both interesting and stimulating. We do know a good deal and some of this information has been very thoroughly exploited. Some traditional localities for certain rarer species have been visited too often by collectors more enthusiastic than prudent. Some commoner species have been reported from so many places in different States that we have failed to think whether we could draw from herbaria any sound conclusions as to the actual distribution, county by county, of the sporadically collected plants.

Some recent results of intensive exploration emphasize by comparison both what may be done and what has not been done. In the vicinity of Squam Lake in central New Hampshire thirty-three species of orchids have been found during a period of about ten years, chiefly by a few of the members of a boys' camp, in a tract of one hundred square miles. During the same period the writer has found the same number of species and with few exceptions, the same species, in the town of Fairlee, Orange County, Vermont, in nearly the same latitude as Squam Lake and about thirty-five miles distant, in an area of less than eight square miles. A few weeks of occasional exploration last summer in Ulster County, New York, chiefly in an unpromising region, resulted in the collecting of fourteen species. Nor are the numerical results the only interesting facts in these explorations. Though the work was done by amateurs, in the Squam Lake region large colonies of *Triphora trianthophora* were found,¹ including in some years thousands of blossoming plants, and valuable data were obtained in regard to the growth and the periodicity of this little-known species. In Ulster county new stations were found for *Triphora*, *Corallorhiza odontorhiza* and *Peranimum ophioides*. In Fairlee *Cypripedium arietinum* was found in great abundance on a dry, rocky hillside; *Cypripedium*

¹ *Rhodora* 22: 53. 1920.

hirsutum, Mill., *Malaxis monophylla* and *Lysiclla*, well established in certain cold bogs, and *Pogonia ophioglossoides* locally very abundant. Many of the more interesting species were not found in the first or the second year of investigation; almost every year was crowned with fresh discoveries. It was not till the eighth summer in Fairlee that *Ophrys cordata* was found. *O. conval-larioides* had not been observed until the year before, though both of these species had been anticipated and searched for.

Moreover, the numbers found in Fairlee and about Squam Lake have a relative significance, in addition to their own value and the identity of the species involved. Thirty-three is just about half the number of species listed in Gray, or in Britton and Brown. It is greater than the number reported from West Virginia and only two less than those enumerated in Miss Blair's carefully compiled Orchids of Ohio. Only thirty-nine species are reported from Alabama and forty from Tennessee. Such numerical comparisons have no exact scientific value. They take no account of the inevitable differences of growth in different regions or of the probable effect of unknown factors. They do, however, say plainly that intensive exploration yields unexpected and valuable results. They do provide incentive for such definite, painstaking study.

The need of this specialized and prolonged study is emphasized, for our native orchids, by reflecting on some reasons why our orchid flora is, apparently, less fully known than, for example, such genera as *Viola* or *Carex* or families like the Mints, the Roses or the Arums. Four reasons may be mentioned, all stimulating to the zealous collector and student; the brief anthesis of many species, the inconspicuousness of many, a prevalent sparcidity of occurrence and the secluded, not to say almost inaccessible, spots in which many species prefer to live.

The ordinary record in the Manuals, as: June, July; May-July, sufficiently accurate for its purpose, obscures the fact that in any one locality the flowering season is much shorter than is indicated by these terms. Of our nearly seventy species in the eastern and middle States, scarcely twelve continue to bloom, in

any one locality, during thirty days, and not more than five or six, chiefly *Habenarias*, in the inclusive sense, for more than one month. For the great majority, the anthesis is brief, often not more than a few days, though it is modified by the presence or absence of the needed insect visitors. Notably in *Cypripedium arietinum* and *Isotria verticillata* the flowers develop and wither within about seven days. *Malaxis unifolia* develops slowly and continuously during the whole summer, but *M. monophylla* has the opposite habit; one might pass by its home unsuspectingly in early July and a week later find the tender scape well-grown and the minute flowers open. This species is probably not so rare as it is reported to be; it hides. Of course many species can be detected quite as readily in fruit as in flower, some, as *Liparis Loeselii*, more readily; but very many plants do not reach the fruiting stage in a given year, and, in the majority of our eastern species, the plant is likely to be less readily discerned after the flowers wither, because of the decay and disappearance of its leaf or the luxuriance of surrounding vegetation or the blending of the tones of color as the summer draws toward its close. Particularly of *Aplectrum* is it true that the infrequent visitor to some regions where it grows might walk over its hiding-place during ten months of the year and not suspect its presence. In some more southern localities its wrinkled green leaves, where it is abundant, are conspicuous through the winter; but throughout most of our region neither the brownish-red leaf-tips in September nor the graying leaves in May are likely to attract any but an experienced hunter. And if there is no fertilization the brown scape withers promptly. Then during three months or more, neither leaf nor scape gives notice of the sleeping corm.

Allusion has been made to the minute blossoms of *Malaxis*. The whole plant too, is small, as is the case also with all of our species of *Ophrys*. There are other causes of inconspicuousness in very many of our orchids. Some grow in dark places, many in the midst of a rank surrounding herbage. Some imitate or at least adopt the prevailing shade of green that is fashionable in their neighborhood. It is difficult often to detect *Liparis*

Loeselii or *Blephariglottis lacera* or *Perularia* or *Malaxis unifolia*, even when one knows they are almost within reach. With several species only the blossom betrays their presence to other than a keen and practiced eye. Some of the taller species grow frequently among grasses and sedges. There are only a few species whose habit is to thrive conspicuously in open places or to form large colonies that attract attention by their size.

It is true that some of our native orchids are noticeable at a distance, because of the size or the beauty of their flowers or because of something unusual in their aspect. No one can pass within range of the bog that harbors the big *Cypripedium* without seeing its splendid flowers, and the coral roots stand out distinctly from the surrounding greens. *Arethusa*, though of short stature, is conspicuously beautiful in bogs, in the spring; if it bloomed in midsummer it would be difficult to detect. The same is true of *Calypto* and even of *Orchis*; though there is a peculiar texture in the leaves and a uniqueness in the whole aspect of any orchid that catches the eye of an enthusiast.

One reason why even the more conspicuous species are not reported more frequently is that they grow in remote or secluded places, difficult to approach or to explore. When these stations are known, they are eagerly visited, but to discover such sanctuaries of beauty requires enthusiasm and knowledge and persistence beyond the usual amateur equipment. There is little doubt that some species accounted rare or local might be found in many places if they were sought for diligently. Some recent discoveries in New York State emphasize this reasonable expectation and indicate clearly the need of exploring even unpromising localities.

Moreover a single visit or a few visits at long intervals will not surely exhaust the possibilities of a region or even of a comparatively small tract. There is with many species—perhaps with all, though it hasn't yet been proved against them—an uncertain periodicity, which baffles the explorer and compels frequent and intensive scrutiny. In Johnson County, Iowa, *Coralorhiza odontorhiza* was common in a certain deep wood in the

year 1896; before and since it has been rare in the same place. This instance is exemplary, not unique. It could be paralleled by many observers if they had made records. Sometimes the periodicity is only in regard to blossoming, as in *Peramium pubescens*, of which the writer knows one colony, containing more than two hundred plants, in which seldom as many as ten are found in bloom in any year, though all seem to be thriving. Some of the tenderer species are affected doubtless by transient climate differences. A severe winter or a late frost may prevent flowering even when it doesn't kill. Some maturity of years is apparently necessary before the first blossoming. The vigor or readiness to bloom which would normally be attained in three or four years may be delayed by unfavorable conditions. We can guess, more or less reasonably, various explanations of the sporadicity of occurrence of many species; but the fact is plainly evident and is another reason why all orchids are not yet fully known. All of these causes, the brief anthesis of some, the inconspicuousness of many in flower or leaf, habitats not easily discovered or approached, a baffling periodicity, combine to present a challenge to orchid-hunters. Those who wish to become really acquainted must take pains and use their eyes and persevere.

2. A second ground for the plea here urged is the rather surprising fact that few if any of our great herbaria are well supplied with abundant specimens for record and future study. Care and diligence are now shown in designating type specimens and in identifying those of an earlier generation. Diagrams of localities, maps indicating distribution, photographs, often including habitat conditions, are multiplying. Card-catalogues in some institutions are prepared to serve both the present and the future. But specimens are too few. Card catalogues emphasize this lack, betray this paucity. Some eager student, fifty years from now, could get, from most of our present collections, no more satisfying answers to his questions about distribution, with its frequent implications of specific differences, than we have now to our queries about the prehistoric Flora of Manhattan!

We have a good deal of material but not enough; a scientific induction needs *all* available facts. Records without justifying specimens are baffling. Specimens from a restricted area or a less than adequate territory may not puzzle but are likely to mislead. Sometimes they are disappointing, as when recently an inquirer came from an adjacent State to one of our larger herbaria to get information about the anthesis of *Blephariglottis fimbriata* and *B. psychodes*, and learned that his private collection furnished a fuller answer than he could get from the very meager possessions of the visited herbarium.

Ten years ago Mr. Oakes Ames published his monograph of *Habenaria*. The stations listed are derived from study of this genus in twenty-two herbaria, including those at Cambridge and Washington, that of the Missouri Botanical Garden and that of the Geological Survey of Canada. In five of these collections, all of the twenty species recognized in Gray's Manual are represented, and all but one or two in four more. It is not surprising that in the rest, about four sevenths of the whole number, chiefly private or local collections, comparatively few species are preserved. It is noteworthy, however, that even in the National Herbarium and the Gray Herbarium, with few exceptions, no more than twenty-five localities and fewer states are represented in the specimens of widely distributed species. The herbarium in Ottawa is better furnished, in the representation of some northern species of this genus, than any in the United States. Additions have been made, of course, to the great collections, during the ten years since, but at the time of the publication of Mr. Ames's monograph, a species so widely distributed and readily discerned as *H. bracteata* (Willd.) R. Br. is represented in the National Herbarium by specimens from thirteen states only, and in the Gray Herbarium from nine; Maine does not appear at Washington, nor Pennsylvania at Cambridge, nor Wisconsin in either collection; assuming that the enumeration in the monograph was complete when it was made. In the writer's own collection, gathered chiefly during the last five years, *Liparis Loeselii* is more widely represented than in one

herbarium that contains more than 100,000 species. The explanation of such regrettable *lacunae* is, of course, easy to find. Not much careful study has been given to the distribution of the Orchidaceae and exploring expeditions covering large areas, have usually been conducted rapidly, with only brief pauses and with scant opportunity for scrutinizing search. Where the reverse has been true, as in some Canadian surveys, a much greater number of stations is represented, in a few herbaria. Speaking generally, but in the language of facts, no one herbarium now tells the whole story of distribution, even as it is now known, for any species of *Habenaria*. Not at the Smithsonian nor at Cambridge nor at the New York Botanical Garden can one study the distribution of our native orchids with all available, not to say all desirable, material. There is enough in several places to encourage the desire for more; but in no one herbarium nor in all together is there adequate representation of the orchid flora of all the states of this country and Canada. All who love our native orchids must wake up to this condition and take pains to improve it before it is too late.

3. For, thirdly, our orchids are disappearing, at least in the Atlantic States. Some have always been labeled "rare" because we haven't hunted for them, but nearly all are rapidly becoming scarce. Never flourishing in our territory with tropical exuberance and sensitive, apparently, to slight changes of environment and association, they are disappearing before many enemies. "Civilization" of course is deadly to them. We are not surprised that the swarming population has driven them from Manhattan Island, where, even fifty years ago, at least seven species were growing though not flourishing. We are, however, surprised and disappointed that in the neighboring Borough of Richmond not more than one or two survive of the twenty and more species that have been found within thirty years. It both enhances and embitters our regret to know that vandalism, rather than the natural processes of reclaiming land for human use, is the chief cause of the disappearance on Staten Island of *Triphora* and *Tipularia* and the fringed *Habenarias*. In places remote from

great cities the process of extermination goes on; trees are felled, swamps are drained, thickets are cut down; golf succeeds grazing; the nooks and dells and shady ravines and springy hillsides disappear. Nature, too, takes a hand in the changes. The salt tides come inland beyond their wont, as in Southern New Jersey; a killing frost penetrates deep or lingers long in many a northern bog; the tender roots of some cherished species are poisoned or shriveled; the station is lost, the colony vanishes. In undiscovered ways, too, natural causes, without waiting to be charted or directed, join with human agencies in hastening the disappearance of our orchids. When we know more about mycorrhiza and the chemistry of soils we may be able to follow these processes more closely; but that enhanced knowledge will hardly reconcile us to the patent fact that species once prevalent become rare and disappear in some localities, without rash collecting or rude despoiling. The writer could go almost to the spot where he collected *Arethusa* in a thriving colony, near Rutland, Vermont, some thirty years ago, but it cannot be found there now, any more than in Fairlee, from which it is reported more recently. When we come upon one lonesome, rather depauperate, plant, and find none of its kindred within many rods or in the same town, we know that we are witnesses of the vanishing of a species. Then when we read, of some rare *Habenaria*, "hundreds of acres of it," "very common in moist fields," "our most common species, sometimes four feet high," we wonder whether other species for which we search now often in vain were once so abundant and luxuriant. For the home of that "most common" species is now a cultivated farm; if you go there you find grass and corn instead of *H. peramoena*. Mr. William Beebe has epitomized many such occurrences: "To every succeeding generation the country near at hand becomes less like wild planet land and more like a museum . . . and only those who love nature enough to make sacrifices of time and effort win through to the few wild places left in far distant corners of the earth." He was thinking of birds chiefly and of the protection (!) afforded by trespass-signs, but his words are fatally true of

most of our native orchids, which shrink before the breath of change and perish in the face of civilization.

Surely there are grounds for our plea. We do not know our orchid flora thoroughly well; what we do know is not adequately represented even in the great herbaria; species are diminishing and disappearing fast. Yet there are rewards for searching; the known stations for *Ophrys australis* in New York State have been multiplying within the last few years; in Cape May County, New Jersey, *Habenaria nivea*, has been found recently and *H. integra* has been rediscovered. Always, fortune beckons and leads to unexpected finds. Pleasure as well as obligation is implicit in the plea for prompt and persistent prosecution of orchid study.

The obligation however seems imperative and clear. Though species disappear, the memory of them must persist and records must support and authenticate it. Not only in our newer dependencies, or in Florida or Texas, where luxuriance invites and frequent discoveries stimulate the explorer, but in the older states, the search for both species and stations should be prosecuted with untiring perseverance. In some states the orchid flora is probably very limited but we want to *know* its extent. In the oldest states scores of counties are unexplored; we want to know their testimony, even though it prove to be only corroborative. We want for the whole country such analyzed information about the periods of growth as is given in Taylor's Flora of the Vicinity of New York. We want certified observations in regard to the insect-helpers of every species. We want, for each genus, at least, such careful study of underground growth as Mr. Lownes has made of *Triphora*. We need "nation-wide" comparison of the dates and duration of anthesis, of identical and related species; for temperature and latitude seem not to tell the whole of this story. Revision is needed of some statements in our Manuals in regard to measurements, time of flowering, rarity, distribution. Most of these requirements imply the work of special enthusiasts, local observers, patiently doing intensive study. Institutions and curators of herbaria can help by

encouraging such personal investigations, as well as by prosecuting generous plans for exploration and exchanging. Local herborizing can best be done by resident amateurs, for no locality tells all its secrets to the tourist; each month shows a different orchid flora and every year has probable surprises in store. Both local and general exploration are stimulated by accurate record and study of what has already been attained. Catalogues of state and local floras, maps and other pictorial helps stimulate effort. Apparent discrepancies clamor for the fuller knowledge that will reconcile them. Lack of information rouses both curiosity and energy. In proportion as we learn more we wish to know the rest. Need stirs us to effort, effort rewards and feeds desire. The gracious circle completes itself again and again.

These reflections will seem to some to look forward to a vague and very distant future. As a matter of fact that future must be near or it will never be reached. We must prosecute our inquiries, collect our facts soon if at all. "Now or never" is literally true of orchid exploration in many places; and "Now" means not more than a few years. As the kind of development in Manhattan is steadily pushing not only the early families but all householders off the island, so advancing civilization is steadily obliterating our native plants. We must hand on descriptions, records, photographs, specimens of the orchids. We must gather our material promptly. We must be busier than the destructive forces. We must do all we can every year.

"The search for lost opportunity is endless" and unrewarded; the search for some undiscovered orchid, though never finished, is a perennial joy.

HERBERT M. DENSLOW.

GRAFTING WITH THE AID OF PARAFFIN¹

(WITH PLATE 250)

The grafting of nut trees has been particularly difficult as a rule for two or three reasons, apparently. Repair of wounds by callus takes place more slowly with some members of the nut-tree group than it does with many drupes or in the rose family. The Juglandaceae, in particular, carry a good deal of sugar in their sap and it is apparently a pabulum for various microbic parasites which exert a destructive influence upon new cell formation. There is a tendency toward drying out of the graft before repair takes place in many of the hard-wood trees and in the hard-wood group nice adjustment between the cut surface of the scion and that of the stock is difficult because of the rigidity of the wood.

Various obstacles are overcome by the method of applying melted paraffin not only to the wound in the stock but also to the entire scion, buds and all. This prevents escape of moisture from the scion and maintains a sap tension corresponding to that of the stock in the presence of negative and positive sap pressures. Furthermore the melted paraffin fills all of the interstices which would otherwise be occupied by decomposing sap.

The form of graft must be adapted to conditions of the stock. For example a branch of stock of approximately the same diameter as that of the scion may be split in the common cleft-graft way. On the other hand if the branch to receive the scion is somewhat larger in diameter than the latter the cleft is made at a point which will allow the cambium layers of the stock and scion to be brought neatly together. Better than the cleft graft is the "bark-slot" method. A slot of the width of the scion is made in the bark of a branch or trunk of almost any size and the scion is inserted into this slot in the bark. Wrap-

¹ Abstract of a lecture delivered at the Garden on May 29, 1920. The accompanying photographs were taken at the time by Mr. R. Reid.

pings of raffia will suffice for small cleft grafts but for the bark slot the Spanish windlass is preferable. This consists of a strong cord tied loosely about the stock where the graft is inserted and this loose cord is then wound up with a skewer acting as a twister. When the cord has been wound tightly enough the long arm of the twister is fixed in the bark of the stock with a two-point tack to prevent unwinding.

This form of fixation of the scion has several advantages. It holds the scion very snugly against the stock. It allows perfect covering of all wound surfaces with melted paraffin and also increased growth of the stock during the summer without need for readjustment of the fixation device. The adjustment is automatic. As the stock increases in diameter during the season's growth it unwinds the Spanish windlass on the stock side with a corresponding winding up of the cord toward the twister side.

When preparing stocks for grafting purposes it is well to cut them back during the dormant season and paint the cut surfaces or cover them with melted paraffin. While this is the preferable way for preparing stocks we find, however, that tops may be cut back at almost any time during the summer after the cessation of the free flow of sap and grafting may be done at the same time. Theoretically the plant physiologist knows very well that such a procedure would shock the tree, but so far as I can determine this shock is not a very serious one.

After the stock has been grafted it is important to break off shoots which start in advance of the starting of the scion buds. This must be continued until the scion buds have made several inches of growth. After that time stock shoots may be allowed to develop in order to help in furnishing pabulum for the root for the next year's growth. At the end of the third year all stock shoots should be removed permanently and only the growth of the graft permitted, provided the graft growth is large enough to balance the root.

Scions are preferably cut during the dormant season and put into cold storage or otherwise preserved until the time for their employment, but by means of the paraffin method it has been

possible for me to do a good deal of direct grafting experimentally, cutting scions directly from a growing tree and inserting them into a stock tree. When we employ the direct method of grafting, all new growth of the year is cut away from the scion and we depend upon older latent buds in the scion. The time for nut-tree grafting is preferably after the leaves are fairly well out and the free flow of sap is less than it is earlier in the season. Practically, I have successfully grafted hickories from March until the last week in July and find that the customary grafting season can now be extended from five weeks to nearly five months. The methods which are employed for grafting nut trees may also be used for other fruit trees.

This brief outline covers only the essential points in the process. More elaborate details will, however, be included in a small book to be published at an early date.

ROBERT T. MORRIS, M.D.

616 MADISON AVENUE,
NEW YORK CITY

EXPLANATION OF PLATE 250

FIG. 1. Inserting a hickory scion in the bark of a hickory stock. The slot is the same length and width as the portion of the scion to be inserted.

FIG. 2. A bark slot at the end of a cut branch. A bit of flat wood is pressed upon the tongue of bark in order to insure better pressure from the Spanish windlass.

FIG. 3. Spanish windlass applied and melted paraffin being brushed over the entire field of work, including all of the scion.

FIG. 4. Fixation of the scion by the use of raffia instead of the Spanish windlass.

FIG. 5. An ordinary side-cleft graft. Melted paraffin is being applied as stated under Fig. 3.

FIG. 6. A hickory demonstration stock showing ordinary cleft-grafting with raffia fixation and bark-slot grafting with Spanish windlass.

NOTES, NEWS AND COMMENT

Bulletin 39, with 94 pages of text, was issued June 30, 1920. It contains the annual reports of the Director-in-Chief and other officers of the Garden for the year 1919.

About seventy pupils from Curtis High School, Staten Island, spent the afternoon of June 25 at the Garden examining the museum collections and the plantations under the guidance of members of the staff.

The library has recently been the recipient of a book entitled "Wild flowers drawn and colored from nature" by Mrs. C. M. Badger, with an introduction by Mrs. L. H. Sigourney. This handsome work, in quarto, with 22 hand-colored plates, is the gift of Mrs. Fannie Griscom Parsons.

Meteorology for June. The total precipitation for the month was 4.04 inches. The maximum temperatures were as follows: 91° on the 3d, 93° on the 11th and 15th, 88° on the 26th and 90° on the 28th. The minimum temperatures were 50° on the 5th, 6th and 10th, 52° on the 19th and 58° on the 23d.

Dr. N. L. Britton, accompanied by Mrs. Britton, sailed for Europe August 7 on the Philadelphia. During his stay abroad he will visit various botanical institutions of Great Britain, France, and Switzerland in the interests of the Garden, particularly in furtherance of the rapidly developing investigation of the flora of northern South America.

Bulletin 38, the fourth edition of the guide to the grounds, buildings and collections of the Garden, appeared June 24, 1920. It contains 125 pages of descriptive text, a general plan of the Garden, and 28 full page illustrations. Several important features have been developed since the publication of the last guide, particularly in the area of over 140 acres added to the Garden early in 1915.

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OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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At Chapel Hill, middle North Carolina, February 10, 1919. Weather conditions here depicted frequently extend to the coast. The progeny of plants sensitive to cold whose seeds are brought northward, commonly by birds, must of necessity migrate slowly and through long periods, especially if of recent origin, geologically speaking. Plants of the older species whose "blood" was used to the lower temperatures that existed southward during the glacial times doubtless migrated northward more rapidly. There is much material in the Coastal Plain, both in the case of cacti and other flowering plants, to be studied from the stand-point of the migration of species.

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IN QUEST OF LOST CACTI

"CACTUS HUNTING IN THE CAROLINAS IN WINTER

WITH PLATES 251 AND 252

The lures of the botanically historic coasts of North Carolina and South Carolina and recent reports of observations on prickly-pears growing there decided the writer to devote a few days' field work to that region in the first week of February, 1919. His experiences and a few incidental historical observations are recorded on the following pages.

His personal interest in the region was first aroused to high pitch during a collecting excursion about the environs of Charleston in February, 1917, when searching that country for several kinds of prickly-pears described from specimens collected there some sixty years ago, and since then wholly lost from view.

The species concerned were "*Opuntia tunoidea*," "*O. macrarthra*," "*O. vulgaris*," "*O. frustulenta*." Specimens of these were exhibited by Professor Lewis R. Gibbes¹ at a meeting of the Elliott Society of Natural History held January 15, 1858, and formally named and described in the "Proceedings" of the society during the same year. This record was unobserved for many years, and unfortunately no herbarium specimens were made, or at least none have been preserved.

¹ Lewis Reeve Gibbes (1910-1894), a graduate in medicine, but professionally a teacher throughout his long career, was a native of Charleston and professor in the College of Charleston for fifty-five years. He was both mathematician and naturalist, and published but little upon any subject, but his ability as a botanist was well known and widely recognized. His herbarium is now incorporated with that of the New York Botanical Garden.—JOHN HENDLEY BARNHART.

The first search¹ in the Charleston country discovered three different kinds of prickly pears. These have since been associated with the botanical names that belong to them, namely: *Opuntia macrarthra* of Gibbes appeared to be a local endemic species and should bear the name Professor Gibbes associated with it. *Opuntia frustulenta* proved to be *Opuntia Drummondii* (*O. Pes-Corvi*) which was originally described from Florida in 1841, and also known from Georgia. *Opuntia vulgaris* of the Gibbes paper represented *Opuntia Pollardi*, a species collected in southern Mississippi in 1896, and described by Britton and Rose in 1908. The writer found this species growing abundantly in northern Florida in 1917.

In February, 1916, we traced the last species in the Atlantic coastal plain as far north as Charleston, and last year a fragmentary specimen of a prickly-pear collected on Currituck Sound, northeastern North Carolina, by Mr. W. L. McAtee,² indicated the occurrence of the species in that region also.

This latter discovery and the finding of a new locality for it near Charleston, South Carolina, by Miss Laura M. Bragg³ influenced us to undertake an excursion to the coasts of the Carolinas mainly for the collection of prickly-pears.

We left New York at midnight, February 1, and spent the day studying plant collections in Washington. The night boat from Washington to Norfolk brought us near the beginning of our

¹ Described under "Cactus Hunting on the Coast of South Carolina" in *Journal of the New York Botanical Garden* 18: 237-246. 1919.

² Waldo Lee McAtee (1883-) is a native of Indiana, and a graduate of the state university of that commonwealth. While still an undergraduate, he was curator of the university museum, and upon graduation entered the service of the United States Biological Survey, in which he is still engaged. He is primarily an ornithologist, but has always been interested in plants as well as birds, publishing accounts of the flora of comparatively inaccessible islands on the coasts of Maine, Massachusetts, Virginia, and Florida, and a number of brief notes upon various botanical topics.—JOHN HENDLEY BARNHART.

³ Laura Mary Bragg (1881-), the curator of books and public instruction of the Charleston Museum from 1909 to 1919, and now director, is a graduate of Simmons College, Boston, in the class of 1906. She is an enthusiastic amateur botanist, and besides her contributions to the *Bulletin of the Charleston Museum*, is the author of a list of the ferns of the vicinity of Charleston, printed in the fourth volume of the *American Fern Journal*.—JOHN HENDLEY BARNHART.

field-work early Sunday morning. The early forenoon found us at Snowden, North Carolina. Snowden is not a metropolis, so several hours had to be wasted in finding some mode of transportation to carry us to our objective some fifteen or twenty miles eastward. Finally the sole horse and buggy of the region was located and the use of both was secured for the rest of the day.

About Snowden the weed crop of the coming season was beginning to appear rather prematurely, but luxuriantly, and the cultivated fragrant honeysuckle (*Lonicera fragrantissima*) was in full bloom. The few pleasant days about the time of this visit had followed a spell of several weeks of rainy weather and a six-inch fall of snow. As a result of the inclement weather, much of the naturally low country west of Currituck Sound was partly under water and the roads were in very bad condition. The horse pulled us through, however, and we finally achieved Waterlily, a small settlement on Church's Island, by passing over a causeway thrown up in dredging a canal. Thence we went northward about a mile, following instructions, and on the sand-dunes at the narrowest part of the island, among the tallest pine trees of this region, we found large colonies of the plant we sought, *Opuntia Pollardi*. There were, naturally, no flowers, but fruits were plentiful.

The definite knowledge of this plant in northeastern North Carolina extends the range fully three hundred and thirty miles north of its former known limit and brings it nearly to the Virginia-North Carolina state-line.

Although it was mid-winter, the landscape was not altogether barren and desolate. In the lower lands, in the swamps particularly, various shades of green exhibited by the evergreen heaths and hollies, were attractive and ever-changing. Flowers, too, were not wanting. All the swamps were copiously decorated with the drooping yellow staminate aments of the alder (*Alnus*) and several heaths had their flower-clusters ready to expand without much delay.

After securing our prize we started back. We had had a pleasant drive earlier in the day; but shortly before sunset,

while returning, the wind shifted and the temperature fell to a painful degree. The mud-puddles and pools encountered on the way out had now become iced, and the drive against the bleak wind had to be interrupted with spells of walking and running in order to keep ourselves from being thoroughly, if not seriously, chilled. By keeping ourselves and the horse moving we reached the railroad in time to catch the night express for the south. Daybreak found us in New Bern, North Carolina, one of the classic botanical fields of the earlier part of the last century.

New Bern is a port of entry, at the confluence of the Neuse and the Trent Rivers, which form an estuary extending fifty miles to Pamlico Sound. It was settled over two hundred years ago by Swiss and German immigrants, who named it for Bern, Switzerland. It later became the capital of the province of North Carolina, and here William Tryon, one of the governors in charge shortly prior to the American Revolution, built what is said to have been the finest residence in the colonies. His name is perpetuated in Tryon Mountain in western North Carolina. This mountain harbors at least one endemic plant (*Psoralea macrophylla*), and it is also one of the southern localities for the northern prickly-pear (*Opuntia Opuntia*).

Subsequent to the Revolution, New Bern produced its only two resident botanists. The career of one, H. B. Croom,¹ is

¹Hardy Bryan Croom (1797-1837), a wealthy planter, was born in Lenoir County, North Carolina, October 8, 1797. He graduated at the University of his native state in 1817, studied law with Hon. William Gaston, and was admitted to the bar, but practiced his profession for only a short time; he married about 1820, and made his home at New Bern. About 1832 he rented a plantation in Florida, on the west bank of the Apalachicola River, opposite Aspalaga, and it was in this vicinity that he discovered *Tumion* (*Torreya*) and *Croomia* early the following year. In 1834 he purchased and began the development of a plantation in Leon County, near Tallahassee, and there he spent a few months of each year, leaving his family in North Carolina. In January, 1837, he purchased the former home of Joel Roberts Poinsett (1779-1851), for whom the genus *Poinsettia* was named, in Charleston, South Carolina, intending to make it his permanent residence. During the summer of the same year he brought his family, as was his custom, to New York City, and in October sailed for Charleston in the steam-packet "Home." This was a new vessel, the finest that had ever been built for the coastwise service; but it was wrecked off Ocracoke Inlet, south of Cape Hatteras, on the second day out (October 9, 1837), and Croom and his entire family, wife, three children, and maid, perished. His charming personality and scholarly attainments intensified the

well known. His botanical interests extended as far as western Florida where he discovered, among other rare plants, one which bears the name of *Croomia* and whose only relatives occur in eastern Asia and Australia. Mr. Croom was evidently the most wide-awake native botanist in the southern states during the earlier decades of the last century. It has been recorded¹ that "Mr. Croom was an ardent lover of Botany and a successful cultivator of the science. In his annual visits to Florida, he availed himself of the opportunities which he enjoyed of examining the vegetable productions of the interesting regions through which he passed. . . . His principal herborizations were conducted in the vicinity of Newbern; and in middle Florida, particularly in the vicinity of Tallahassee, and along the Appalachicola River. . . .

"Mr. Croom had projected a plan for extensive botanical explorations in Florida; "

The career of Croom's associate, H. Loomis² is almost unknown.

Although subsequent native or resident botanists failed those parts, succeeding generations were evidently interested in plants, as is evidenced by the specimens of shrubs and trees extant in the gardens about the older houses in New Bern.

The more conspicuous trees in the gardens were fine old trees of *Cunninghamia* just coming into flower and old giants of the crape-myrtle (*Lagerstroemia*). On the roadsides and in vacant lots violets (*Viola*), barren-strawberry (*Duchesnea*), sour-grass

sorrow of Torrey, Gray, Chapman, and his other botanical friends. Besides his catalogues of the plants of New Bern, Croom had contributed several papers to the American Journal of Science and Arts, and one to the Annals of the Lyceum of Natural History of New York. Death, however, claimed him when he seemed on the very threshold of an unusually productive botanical career. A monument to the memory of Croom and his family stands in front of the Episcopal church at Tallahassee.—JOHN HENDLEY BARNHART.

¹ John Torrey in preface to A Catalogue of Plants, Native or Naturalized, in the vicinity of New Bern, North Carolina.

² H. Loomis, who collaborated with Croom in the preparation of his first catalogue, was at that time (1833) a physician at New Bern. Shortly afterward, in or before the year 1835, he removed to Macon, Georgia, and it was probably at Macon that he died, about December, 1837. At least two species of plants, *Pycnanthemum Loomisii* Nutt. and *Lysimachia Loomisii* Torr., bear his name.—JOHN HENDLEY BARNHART.

(*Xanthoxalis*), dandelion (*Leontodon*), spurge (*Chamaesyce*), and henbit (*Lamium*) were blooming. Annual grasses were in flower, while perennial grasses were just beginning to put forth their new leaves. Among the cultivated plants then in bloom, violets (*Viola*), daffodils (*Narcissus*), chrysanthemums (*Chrysanthemum*), and tick-seeds (*Coreopsis*) were represented.

We arrived at Wilmington, North Carolina, about noon. This, like New Bern, is classic botanical ground. The city is situated on the left, or east, bank of the Cape Fear River about thirty-four miles from its mouth at Cape Fear, but only about fifteen miles from the coast to the eastward.

Wilmington is younger than New Bern by twenty years. Although it was not favored as the residence of a colonial governor, it was geographically a better seaport, and it soon outgrew its neighbor. It, too, can boast of a longer list of native, resident, transient and itinerant botanists.

Among the last, in the early part of the last century, may be mentioned H. B. Croom who has already been referred to and William Baldwin.¹ As a surgeon in the navy, Baldwin's duties took him to Wilmington, North Carolina and Wilmington, Delaware, which were both naval stations. In his preserved correspondence to botanical friends, it is sometimes difficult to tell from which Wilmington he wrote his letters.

The transient botanist of Wilmington was the celebrated Frenchman A. R. Delile.² He, however, left little or no permanent botanical record of his sojourn in that region.

¹ William Baldwin (1779-1819), a medical graduate of the University of Pennsylvania and a surgeon in the United States navy, was an enthusiastic student of the flora of the southern states. In 1805-06 he visited China, and in 1817-18, South America, but more than half of the last decade of his short life was spent in Georgia and neighboring states.—JOHN HENDLEY BARNHART.

² Alire Raffeneau-Delile (1778-1850) was a native of Versailles, France; when only twenty years of age he was one of the scientists chosen to accompany the Napoleonic expedition to Egypt, and was placed in charge of the botanic garden then established at Cairo. From 1803 to 1805 he was French vice-consul at Wilmington; he then studied medicine in New York City, receiving his M.D. degree from Columbia College in 1807, and returned to France in the same year. The last thirty years of his life were spent as professor at the university of Montpellier, and director of the botanic garden there. He is best known for his elaborate works on the flora of Egypt.—JOHN HENDLEY BARNHART.

The resident botanists who have contributed to the local plant literature were M. A. Curtis,¹ a clergyman who studied the flora of other parts of the State as well, and Gerald McCarthy² who for many years was associated with the State department of agriculture.

The native botanists are represented by J. F. McRee³ and T. F. Wood.⁴ Both these men were primarily physicians, but they have left us their record as botanists too.

Among the above-mentioned botanists, M. A. Curtis is most

¹ Moses Ashley Curtis (1808-1872) was a native of Stockbridge, Massachusetts, and a graduate of Williams College in the class of 1827. In 1830 he went to Wilmington, North Carolina, as a tutor, and from his first arrival devoted all his spare time to the study of the flora of the region, of which he published an enumeration in 1835. From 1835 until his death he was an Episcopalian clergyman, most of the time engaged in missionary work in various parts of North Carolina, although for nine years, 1847-56, his home was at Society Hill, in South Carolina. His reputation as a botanist was based almost entirely upon his work with fungi, but he never lost his interest in the study of flowering plants, publishing a catalogue of the plants of North Carolina as late as 1867.—JOHN HENDLEY BARNHART.

² Michael Gerald McCarthy (1858-1915) was for many years a student of the flora of North Carolina. When he first began to write upon the subject, about 1884, he was a student at Gallaudet College, Washington, D. C., where he graduated in 1887; when the office of botanist to the North Carolina Agricultural Experiment Station was created, in 1888, he was appointed to the new position, which he occupied for nearly ten years; in 1897 he became botanist and biologist of the North Carolina Board of Agriculture, retiring in 1907. Throughout these twenty years, 1888-1907, he was looked upon as "state botanist" of North Carolina, although no such office actually existed. In 1904 Gallaudet College conferred upon him the honorary degree of Doctor of Science.—JOHN HENDLEY BARNHART.

³ James Fergus McRee (1794-1869) was born near Wilmington, North Carolina, and resided in or near Wilmington all his life. He received the degree of M.D. from the College of Physicians and Surgeons of New York in 1814, and practiced his profession, with one brief interval, from that time until 1846, when he retired. His study of botany began at an early age, and continued throughout his life. His advice and friendship, and the free use of his botanical library, were of great value to Curtis, who named *Galactia Macreei* in his honor.—JOHN HENDLEY BARNHART.

⁴ Thomas Fanning Wood (1841-1892) was born and died at Wilmington, North Carolina, where he was a physician for many years. His professional education was secured at the Medical College of Virginia, at Richmond, and he received the degree of LL.D. from the University of North Carolina in 1889. He was active in the work of the medical society, the board of health, and the board of medical examiners of his state, and the American Medical Association. During the Civil War he was an assistant surgeon in the Confederate army.—JOHN HENDLEY BARNHART.

widely known, largely through the specimens he distributed. In the latter part of his career he conceived an idea the realization of which would have given him wider renown. However, the execution of this idea fell to the lot of A. W. Chapman¹ who crystallized it in his "Flora"—a truly remarkable work when we stop to consider all the circumstances under which it was written and produced.

At Wilmington we had the coöperation of Mr. D. W. Gross,² Corporation Engineer of the Atlantic Coast Line Railroad Company. Mr. Gross is well acquainted with the environs of Wilmington and consequently no time was lost in locating the cactus that is common in that region. Up to this time the weather had been clear, but now rain set in and continued for three days.

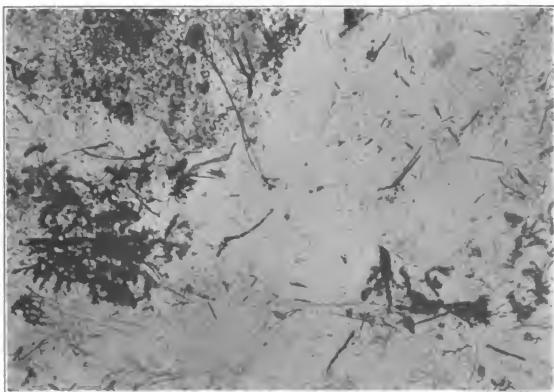
The bluffs of the inlets along the coast east of Wilmington were first investigated. There the crow-foot prickly-pear was found growing in greater luxuriance than we had seen it elsewhere.

Observations there concerning the flowering and fruiting of this plant confirmed those formerly made at Apalachicola, Florida. These make clear on the one hand the reason for the idea prevalent among the inhabitants where *Opuntia Drummondii* grows naturally, to the effect that the plant makes neither flowers nor fruits, and, on the other hand, the interesting way the plant has developed of adapting itself to different environments.

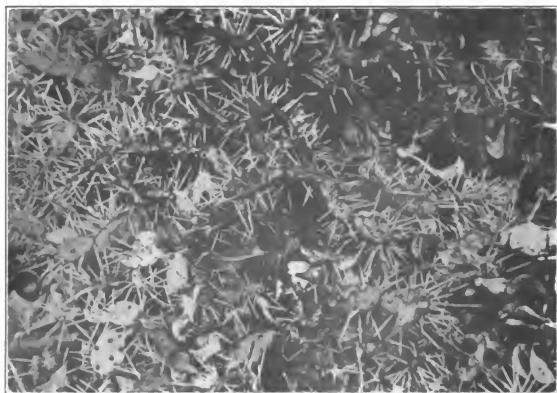
In all our experience with the crow-foot prickly-pear in North Carolina, South Carolina, Georgia, and Florida, we had never

¹ Alvan Wentworth Chapman (1809-1899) was a graduate of Amherst College who went to Georgia as a teacher, studied medicine there, and soon afterward entered upon the practice of his profession in Florida. For more than half a century his home was at Apalachicola, where he died in his ninetieth year. His "Flora of the southern United States," first published in 1860, and running through several editions, was for nearly fifty years the only manual of the flowering plants of the southeastern states.—JOHN HENDLEY BARNHART.

² Daniel Wingerd Gross (1871-) is a Pennsylvanian by birth, and graduated as a civil engineer from Pennsylvania State College in 1893. He has been engaged in railroad engineering work ever since, and is now located at Wilmington, North Carolina, as Corporation Engineer of the Atlantic Coast Line. He has always been interested in the botany and zoology of the regions he has visited, or those where he was stationed.—JOHN HENDLEY BARNHART.



Crow-foot prickly-pear, specimens originally from the coast of South Carolina, on an artificial sand-dune in the cactus plantations at Buena Vista, Florida. This figure shows how the plant grows on the coastal dunes from North Carolina to Florida. The growth is usually more scattered than here shown, and the plants are barren, perhaps as a result of the slight nutriment in the shifting sands.



Crow-foot prickly-pear in a plum-thicket near Wilmington, North Carolina. In this and in similar places large areas are densely carpeted with joints several layers deep, and the plants are very fructiferous. Although the joints are as loosely attached to each other as they are in the case of plants on the dunes, the effectual protection from sweeping winds and meandering animals encourages a dense growth which is augmented by the accumulation of more nutriment in the form of humus.

before found it fruiting in its typically natural habitats, that is, on the active sand-dunes along or near the coast. There it grows plentifully, both in exposed and in naturally sheltered positions. However, in artificially protected places, such as dense plum-thickets, which perhaps represent former settlements of the aborigines, on ruined walls of old buildings, and in partly filled cellars, the plants grow in dense masses, often with the joints several layers deep, and there they produce great quantities of fruit. We cannot speak directly for the flowers, as we have not observed this prickly-pear during the flowering season; but the fruits are, naturally, the results of the flowers. Thus *Opuntia Drummondii* behaves in two ways in the matter of perpetuating its kind. Each joint represents the direct possibility of a new plant independent of flower and fruit. In a natural habitat these joints, being so loosely articulated, are easily separated from each other, carried about and distributed. Thus joints are transplanted both by the wind and by the numerous native animals that inhabit and travel about the region. Consequently, we find the species extensively and often quite evenly distributed on the sand-dunes, particularly along and about the trails of animals, however, never in particularly massive accumulations, but apparently always fruitless. Just why this condition should obtain is not wholly clear, but it may be a matter of nourishment. It has been observed that the soil of the present natural habitats is poor. The available nourishment is clearly below that which the plant could use. The plants are plentiful, but the joints are small, often very small, and have the appearance of being undernourished. In this condition they fail to produce flowers.

In the artificially sheltered habitats we find a different state of affairs. There, where the plants are protected from the wind and from the meandering native animals, we find colonies growing in dense masses and copiously fruited. It would seem that the joints increase just as copiously as they do in the natural habitats, but instead of being scattered they are piled up in masses. That the plants derive more nourishment from the soil in the artificial habitats is evidenced by the much larger

size and healthier condition of the joints. Hence, under the stimulus of sufficient nourishment there the plants propagate sexually as well as vegetatively.

Prickly-pear fruits, or rather the seeds, are much sought after by birds, in fact some birds seem to be ravenously fond of them. Thus it might be argued that the birds destroy the fruits in the natural habitats of this plant. This might be a reasonable argument were it not for the fact that in localities where the three species, *Opuntia Drummondii*, *O. macarthurra*, and *O. Pollardi* grow together, there is present a plenty of fruits of the second and third cited species, while the first is barren! And further, the fruits of *O. macarthurra* and *O. Pollardi* are much more accessible to a bird on account of the decidedly less vicious armament of the joints of those two species.

The second day at Wilmington was devoted to the coastal dunes at a point called Figure Eight Woods. This locality is characterized by a copious growth of red-cedar and various other woody plants. The red-cedar is the dominant tree, at least in size; the other woody growth is much stunted and there are extensive forests with a maximum height of two or three feet. These miniature trees were mostly red-bay (*Tamala*), yaupon (*Ilex vomitoria*), and Dahoon-holly (*Ilex Cassine*). All through these diminutive forests were the trails of small native animals and along and near them were endless patches of the crow-foot prickly-pear. The main object of our investigation of these dunes was to discover the long-joint prickly-pear (*Opuntia macarthurra*), heretofore known only from the Charleston, South Carolina region. In this we were disappointed.

In many places the sand of the dunes was covered with sand-loving mosses that had recently put forth much new growth. Other areas were clothed with a carpet of the partridge-berry (*Mitchella repens*). A striking Adam's needle (*Yucca*) grew everywhere on the dunes. It had stiff spatulate leaves, but it was neither in flower nor fruit. This region is outside of the hitherto known geographic range of the genus *Yucca*. This fact, taken in connection with the unique leaves, indicates that it very likely represents an undescribed species. In sheltered

places the ebony-spleenwort (*Asplenium platyneuron*) grew luxuriantly with very tall leaves. Withered or half-withered leaves measured nearly two feet in length, while vigorous new leaves had started for the coming spring's growth. The interesting vine all through the diminutive forests, aside from the native species of horsebrier (*Smilax*), was the Japanese-honeysuckle (*Nintooa japonica*). In all appearances this was a native vine; but the seeds were evidently introduced there by birds, and finding a congenial habitat, the plant not only perpetuated itself, but it appears to be spreading extensively. The maritime environment has produced a different looking plant from the ordinarily cultivated form.

Between Wilmington and the coast we passed through large areas of marsh that several months later would be covered with the blossoms of the celebrated Venus fly-trap (*Dionaea*). This interesting plant is often reported to be on the verge of extermination; but it is still plentiful about Wilmington, and we have lately received reports of extensive areas of it about ninety miles inland. Many of the introduced and native plants observed in bloom at New Bern were also flowering at Wilmington. In addition the bluets (*Houstonia minima*) were flowering in the low woods east of the city.

A combination of circumstances defeated our plan to stop at Georgetown, South Carolina, so we went from Wilmington to Charleston. Although we did not go to Georgetown, we have a record of an observation on a prickly-pear made there by Mr. W. L. McAtee of the Biological Survey. He says in a letter: "In your investigations of cacti, you might wish to look up one I saw near Georgetown, South Carolina. It was of ascending habit, one and a half to two feet high, with long, nearly spineless joints. It grew on sand hillocks amid the coast marshes of localities known as Cedar Island and Murphy's Island." This record clearly indicates *Opuntia macrarthra* of Gibbes, heretofore known only from the vicinity of Charleston.

In Charleston we were brought face to face with the main task of our trip, namely, the rediscovery of Gibbes' *Opuntia tunoidea*. While at Charleston we had the facilities of the

Charleston Museum, through the kindness of Professor P. M. Rea,¹ the Director, and Miss Laura M. Bragg, Curator of Public Instruction, successfully arranged for all the field work.

The first task undertaken was that of looking up the mysterious prickly-pear located by Miss Bragg a year ago. Our objective lay about thirty miles southwest of Charleston. A well-nigh impossible road separated us from our goal; but we made the attempt and accomplished our errand. We have participated in some exciting motor trips in peninsular Florida and elsewhere, but this one eclipsed them all. What we needed was an *aéroplane* instead of an automobile. We started out with a new automobile and brought it back an apparent wreck, and, in addition, thoroughly camouflaged. Long stretches of the road were submerged beneath a foot or eighteen inches of fluid mud. In order to get through, it was necessary to charge these sloughs at high speed and take a chance between reaching the other side safely or ditching the car. Fortunately, we came out all right. We do not know what was buried under the mud, but often the car would strike objects that would throw it out of the mud; thus sometimes the car was on the ground and sometimes in the air. However, it always came down right side up, and we still survive. Black and blue spots from head to foot, broken watch-crystals and smashed fountain pens were the chief penalties of the ride, and only once were we buried so deep in the mud that we had to call on the fortunately nearby State chain-gang to come with shovels and dig the car out! However, the severity of the jolting may be best illustrated by the statement of one of the ladies who rode on the back seat of the car, and her veracity is ordinarily unimpeachable. She claimed that before we were half way to our destination both her rubbers were joggled off

¹ Paul Marshall Rea (1878-), director of the Charleston Museum from 1903 to 1920, professor of biology in the College of Charleston from 1903 to 1914, and professor of embryology and physiology in the Medical College of South Carolina from 1911 to 1920, is a native of Massachusetts and a graduate of Williams College. Before his appointment at Charleston he was assistant in biology at Williams, and a field assistant in the Bureau of Forestry. He was one of the founders of the American Association of Museums; its secretary, and as such the editor of its Proceedings, from 1907 to 1918; and is president of the association for the current year, 1919-20.—JOHN HENDLEY BARNHART.

and by the time we reached Rockville the laces of her shoes were untied!

Rockville is located on the southernmost point of Johns Island. It lies on a small promontory on the North Edisto River facing directly south, and opposite the eastern end of Edisto Island. It was named Rockville, perhaps, so that the imagination could furnish the rocks to break the monotonous environment, which is made up of sand and water.

When we alighted from the motor-car, the reward of the strenuous ride was before us, and the last mystery of the Gibbes quartette of prickly-pears was solved.

We walked out to the shore and there, with our backs toward the few houses, we might just as well have been standing on Cape Sable, Florida, or some of the Florida Keys six hundred miles further south, not only as regards the view, but as regards the vigorous plants of the large *Opuntia Dillenii* of tropical America, or a species so much like it in vegetative character that without either flowers or fruits it is indistinguishable. It represents Gibbes' *Opuntia tunoidea*, which had not been collected for a period of sixty-odd years. The flowers and fruits have yet to be seen, and must be secured before its real specific relationship can be determined.

The largest plant, growing as a circular bush about ten feet in diameter, had been for the most part destroyed by the building of a house on the site. The disarticulated remains were scattered widely over the lawn-like dune and they were, naturally, taking root. The larger intact specimens were growing near the tideline, while smaller ones grew in the partial shade of shrubs and trees near the crest of the low dune. In the case of larger plants, joints up to eighteen inches or more were not uncommon. Their armament was just like that of Dillen's prickly-pear of Florida and the West Indies.

After securing enough specimens for growing in the cactus plantation at Buena Vista, Florida, and in the conservatories at the New York Botanical Garden and at Washington, we regretfully began our homeward journey; not that we regretted leaving Rockville, but what we looked forward to on the motor

trip before us. We did not feel safe until we had successfully charged the last sea of mud just outside of Charleston. Fortunately for us and also the cause of *Cactus*, we made the return without any casualties.

The following day was devoted to the eastern end of James Island in the vicinity of the Quarantine Station, through the courtesy of the Officer-in-Charge, Dr. H. M. Manning.¹

Prickly-pears were abundant on the sand-dunes on that part of the island. The large one we collected at Rockville, however, was not represented; but the other three species of the region grew promiscuously all over the dunes. They are: *Opuntia Drummondii*, *O. Pollardi*, and *O. macrarthra*. Although these species grew intimately intermixed, there was no sign of intergradation nor hybridization. The first-named species was without fruit, while the joints of the second and third still held the berries of the past season in many cases. The joints of *Opuntia Pollardi* and *O. macrarthra* furnish a staple food for rabbits. These animals had dexterously eaten the epidermis and some of the pulp of the joints, carefully avoiding the areolæ or bristle-cushions, thus often giving quite a variegated effect to the plants. The joints of cock-spur cactus (*Opuntia Drummondii*), although just as succulent and nutritious, were untouched, apparently on account of their being more copiously spine-armed.

Prickly-pears thus support animal life in several ways. The fruits, particularly the seeds, are a favorite food for birds, the joints maintain cattle and rabbits, and perhaps related animals, while we have seen signs of the tubers of some species being eaten by rodents. The tubers, which are borne in great quantities by some species, would doubtless furnish a starch which would be useful to man.

¹ Herbert Miller Manning (1878-) is a graduate of the medical school of Columbian (now George Washington) University, of the class of 1900. In 1903 he entered the Public Health Service of the United States, and in his capacity as a health officer has been stationed at various ports: in Hawaii and the Philippines, at New York, at New Orleans, at Key West, and for several years past, at Charleston, where he was also professor of tropical medicine in the medical college. He is now in charge of the marine hospital at Memphis. Bacteriology has been Dr. Manning's specialty in botany.—JOHN HENDLEY BARNHART.

The same cultivated plants and weeds found blooming at New Bern were also observed at Charleston. The old brick walls in town furnished good collecting ground for mosses and hepatics. An interesting moss (*Desmatodon plinthobius*) was first found on these walls about the middle of the last century. We collected it on similar walls in passing through New Bern. The brick walls of Charleston are often conspicuous ferneries. Two kinds of ferns are usually present, the Huguenot-fern (*Pteris multifida*) and the ebony-spleenwort (*Asplenium platyneuron*). The former was the more common of the two. It is called the Huguenot-fern because of a tradition that it was brought to South Carolina by the Huguenots. However, there is little or no evidence to support this tradition.¹ Another favorite tradition is prevalent in the same region. It is commonly believed that the little Japanese bush-clover (*Lespedeza striata*) was introduced into South Carolina and other southern states during the Civil War period; but it is really known to have been thoroughly naturalized, at least in Georgia, a quarter of a century previous to the outbreak of the Civil War.

The first definite record of the Huguenot-fern in the United States was its discovery on brick foundations in 1868 by Professor Lewis R. Gibbs. Since then it has taken possession of all kinds of brick walls, often growing in masses that completely hide the bricks. However, it was not common there this year, for the extreme cold weather of the winter of 1918 had wholly or partly killed the growth on many walls where it once was abundant. It is now not confined to Charleston, but has been found as far inland as Columbia, as well as at intermediate points.

The other interesting fern, the native ebony-spleenwort, grew less plentifully than its associate. However, on first thought, one would not consider it *Asplenium platyneuron*, the artificial habitat evidently encouraging a quite abnormal habit of growth and size. Compared with specimens of the same species we found at the coast-region of Wilmington, North Carolina, in a natural habitat, the differences were quite marked, not to say misleading.

¹ For a full discussion of this plant see L. M. Bragg, in Bulletin of the Charleston Museum 10: 19-21, 1914.

Having accomplished the objects of our visit to Charleston, we set out for the final objective in the Carolinas, namely, Chapel Hill, North Carolina. One evening we left Charleston, with its almost summer weather, and reached Selma, North Carolina, early the next morning just in time to see the train that was to take us to Raleigh pull out of the station. Thinking not to be delayed in reaching Chapel Hill, we procured a motor-car at Selma and started for Raleigh thirty-two miles distant. Then the weather conditions changed; with every mile we could notice a fall in the temperature. Upon reaching Raleigh snow began to fall and soon six inches of soft snow covered the whole country. No kind of transportation from Raleigh to Chapel Hill could be secured until the arrival of the regular evening train. This brought us about dark to Durham, whence we proceeded to our destination by motor-car over a long road covered with snow—a rather exciting, not to say perilous, ride.

Plans for field work at Chapel Hill were defeated by the snow storm just referred to, but a profitable day was spent in the arboretum, laboratories, and herbarium of Professor W. C. Coker¹ at the University. The following day found the writer back in New York and at the Garden, and curiously enough in a milder climate than that of the then frigid South.

To sum up: The presence of the southern prickly-pear (*Opuntia Pollardi*) on the dunes of Currituck Sound, northeastern North Carolina, as suggested by the fragmentary specimens previously collected there, was definitely established. This species, as well as its frequent associate, *Opuntia Drummondii*, which has been found as far north as Ocracoke Island in Pamlico Sound, North Carolina, is to be expected on the sand-dunes in Virginia south of Cape Henry, if not north of Cape Charles.

However, the most satisfactory result of the excursion was

¹ William Chambers Coker (1872-) is a graduate of the University of North Carolina, where he has been professor of botany since 1902. He had received his degree as doctor of philosophy at the Johns Hopkins University the preceding year, and spent the interval in study at Bonn. Professor Coker is a member of many scientific societies, and is well known by his contributions to botanical literature. He was president of the North Carolina Academy of Science in 1909, and has been editor of the *Journal of the Elisha Mitchell Scientific Society* for more than fifteen years.—JOHN HENDLEY BARNHART.

the clearing up of the last mystery in connection with the species of *Opuntia* described by Professor Gibbs over sixty years ago, thus settling the questions raised by the interesting, but much neglected paper, referred to in a former report,¹ that have hung in the balance for several generations.

In the paper referred to, Professor L. R. Gibbs describes and names four kinds of prickly-pears he found growing naturally about Charleston, South Carolina. As we have finally found all of the Gibbs' plants, it may be well to repeat what Gibbs said concerning them and refer them to their proper species. Taking them up in the order recorded by Gibbs we have:

"The first, which we will call *Opuntia tunoidea*, falls under Engelmann's subgenus *Platopuntia*, section *Grandes*, is erect, or suberect, with large ovate joints, armed with yellowish spines, tipped with brown, about three quarters of an inch long. The flower and fruit we have not yet procured."—This represents the plant we secured at Rockville. We, too, have not seen the flowers or fruits; but the plant in its vegetative condition cannot be separated from the tropical *Opuntia Dillenii*.

"The second, which we call *Opuntia macrarthra*, falls under the same section with the preceding, and seems to be near *Opuntia angustata* of Engelmann, from the west of the Rio Grande; a prostrate species, joints from ten to fifteen inches long and three inches wide, one third of an inch thick, no spines, fruit two and a half inches long, slenderly clavate."—This is the endemic species of the middle South Carolina coastal region. Gibbs describes it as spineless, but like most of the spineless prickly-pears, odd plants or individual joints may sometimes bear a few spines.

"The third species is *Opuntia vulgaris*, the *Cactus Opuntia* of Elliott, and others, common throughout the State."—This really represents *Opuntia Pollardi*, a species of the coastal plain now known to range from northeastern North Carolina to southern Mississippi. The species it was long confused with—*Opuntia Opuntia*—is confined to the mountains and to the Piedmont region.

¹ Journal of the New York Botanical Garden 18: 243, 244. 1917.

"The fourth, which we will call *Opuntia frustulenta*, probably falls under Engelmann's section *Xerocarpaceae*, of the same subgenus; plant prostrate, joints subcylindric, two to six inches long, armed with spines, white, one fourth of an inch long, large for the size of the plant, joints separating readily."—This represents *Opuntia Drummondii* (1841) and *Opuntia Pes-Corvi* (1860), described originally from Florida and now known to range along the coastal sand-dunes and the immediate vicinity from North Carolina to western Florida, and perhaps into Alabama.

Our experiences in the Carolinas suggest the possibilities of the extension of the geographical ranges of some of the typically southern prickly-pears into Virginia, and even into Delaware, where the genus *Opuntia* is now known to occur in the wild state. Specimens have not yet been collected and we consequently do not know if the plants represent one of the southern species, extending northward in the coastal plain, as we would naturally expect, or if they represent the common prickly-pear (*Opuntia Opuntia*) extending into the coastal plain from the adjacent Piedmont plateau.

JOHN K. SMALL

GEORGE W. PERKINS

George W. Perkins, a member of the Board of Managers of the New York Botanical Garden since 1900, died, after a brief illness, on June 18, 1920.

Mr. Perkins was greatly interested in parks and gardens and he was a lover of plants. He frequently visited the New York Botanical Garden and contributed liberally to all special funds for construction and development; his advice on many subjects has been valuable to the institution. In recent years, his time for public service has mostly been given to the establishment and development of the great Interstate Palisades Park in New York and New Jersey, a splendid monument to his indefatigable activity and good judgment.

Resolved: That his associates in the management of the New York Botanical Garden deeply mourn his loss and direct that this preamble and resolution be entered upon their minutes, printed in the JOURNAL of the Garden, and that a copy be sent to his bereaved family.

Approved by the Executive Committee, July 22, 1920.

N. L. BRITTON,
Secretary

NOTES, NEWS AND COMMENT

Dr. Mario Calvino, of the Agricultural Experiment Station, Santiago de las Vegas, Cuba, visited the Garden August 11 enroute to Europe.

Professor Charles J. Chamberlain, of the University of Chicago, paid a visit to the Garden August 11 on his way to the meeting of the British Association for the Advancement of Science, where he is to deliver an invitation address on the subject of "Cycads."

Dr. W. A. Murrill visited Hollins College, near Roanoke, Virginia, on July 31 and August 1, where he was invited to make several parlor talks on popular botanical and horticultural subjects.

T. V. Rand and H. E. Thomas, former students of the Garden, received the degree of Ph.D. from Columbia University at its commencement last spring.

About sixty pupils in the summer school of Columbia University, accompanied by Mr. L. W. Crawford, Jr., visited the Garden on the afternoon of August 9 and were shown through portions of the grounds and buildings by Dr. Barnhart, Dr. Seaver, Dr. Pennell, and other members of the Garden Staff.

A set of western American mistletoes—specimens of *Razymoufskya* and *Phoradendron*—distributed by Professor James R. Weir has been incorporated in the herbarium.

A gift of several dozen specimens representing the commercial varnish resins brought together by Messrs. Nobles and Hoare of London, has been received for the Economic Collections from Messrs. Pomeroy and Fischer of New York.

A collection of nearly five hundred specimens of flowering plants from southern Oregon and Mt. Jefferson, California, made by Professor M. E. Peck, has been added to the herbarium.

Many readers of the JOURNAL will be interested in the new quarterly magazine *Ecology*, the official organ of the Ecological Society of America. Dignified in appearance and authoritative in tone, the magazine will present the results of the latest research in the ecological relations of both animals and plants.

Meteorology for July: The total precipitation at the Garden for the month was 3.68 inches. The maximum temperatures recorded for each week were 90° on the 10th, 91° on the 13th and on the 24th, and 90° on the 31st. The minimum temperatures were 56° on the 6th, 54° on the 17th, 51° on the 26th, and 54° on the 27th.

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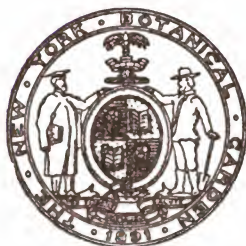
JOURNAL

OF

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EDITOR

H. A. GLEASON

Assistant Director

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NOTES ON THE HISTORY OF THE BEARDED IRIS

There has been no comprehensive authoritative work published on this interesting subject, and it will be part of the duties of the American Iris Society to collect information about Iris growing and Iris breeding from various people and to assemble it into a complete history. In the meantime, however, some preliminary notes of what we have already discovered may not be out of place.

Bearded Irises are native to Central and Southern Europe and Asia Minor, extending from the Alps through Italy, Hungary, Bulgaria, Palestine and Mesopotamia. Wild forms as generally known are the dwarf species of Iris of the Alps, represented best by *pumila*. The forms of *germanica* which are mostly native to Asia Minor, the blue *pallida* of Italy and Asia Minor as represented in many forms, the wild *variegata* of Hungary and Austria, and the wild forms from Asia Minor, such as *trojana*, *Ricardi*, *cypriana* and *mesopotamica*. It is not known when these varieties were first cultivated by man, but it is known that one of them, *albicans*, was carried all over southern Europe as far west as Spain by the Mohammedans, who planted them on the graves of their soldiers. It is not known when they began to do this, but it is known that they were driven out of Spain before 750 A.D. We have no knowledge of any Iris growing between that time and 1790, when in European catalogues about a half dozen or a dozen wild forms were offered. It is evident that between 1800 and 1850 the growing of Iris in gardens began in earnest, and that several breeders, among them Lemoine, Jacques, and Salter, began their work and produced quite a number of

new forms of Iris as of many colors. These Irises were all the progeny of two species, *pallida* and *variegata*, and they combined colors which today are known in the six sections, *pallida*, *variegata*, *amoena*, *neglecta*, *plicata*, and *squalens*. These six groups were until recently considered all species, but it has now been proven that they are all the result of *pallida* and *variegata*; but it is not known whether these early breeders worked with the pure strain of *pallida* and *variegata*, or whether they found wild self-hybridized Intermediate types between them and used these for their breeding. We have at present no record of just what these three men did, and the first record we do have of any named varieties of Iris is in 1855 when half a dozen or more varieties were offered under name by the nurseryman Dauvesse, of Orleans, France. Most of the varieties which he offered have since disappeared from the garden, but among them was the well-known variety Mme. Chereau.

Following 1855 we have again a lapse of twelve years about which we know nothing, until in 1867 Louis Van Houtte, of Ghent, Belgium, offered in his catalogue almost 100 named varieties, which we presume to have been the work of the three men mentioned and of Louis Van Houtte himself. For the next fifteen years Van Houtte remained the greatest introducer of Iris, introducing several hundred varieties of which only a few dozen are still known. His work was followed by the work of French breeders, of which we have no record at present, culminating in Verdier; and by Dutch breeders such as Krelage, Roozen, Leeuwen and others, and in England by Peter Barr, better known as a Daffodil expert. The varieties of Belgium and Holland were sent to France, and were by the French sometimes sold to England in mixtures, at auction, and it is through such a state of affairs that many varieties originating on the Continent and named there, were on their arrival in England renamed with English names, so that we cannot tell for certain to-day whether the many varieties bearing English names are all of them of English origin.

Peter Barr was one of the first to import varieties of Iris from the Continent and to give them English names, but he also

named many of his own seedlings. We have at the present time no exact records to show which are which. But such varieties as Albert Victor, Celeste, Lady Jane, Albatross, Cottage Maid, Perfection, Dr. Bernice, and others, are supposed to represent the Barr seedlings, and it is this collection of Iris, imported in 1905 by the American pioneer Mr. Bertrand H. Farr, of Wyoming, which really laid the foundation for the present American interest in Iris. This collection and all others reaching America before 1905 represented only the hybrids of two species, *pallida* and *variegata*.

Iris breeders, however, were not long content to work with these species only. Sir Michael Foster, to whom the English refer as the "Father of Iris," began in the 80's to collect Iris species and Iris forms from all parts of the world, and to use them for breeding. His most sensational work was undoubtedly the crossing of the Bearded Iris with the *oncocyclus*, a race difficult to grow in England and almost impossible to grow in the eastern portion of the United States. The resulting crosses are valuable because they flourish in England and can be grown here with more or less success. Some of them are exquisitely beautiful in their deep copper tones and delicate tracings, which they have inherited from the *Oncocyclus* parent and which are not to be seen in the Bearded Iris proper. Among the best of these varieties are Dilkush, Parvar, and Shirin. From a gardener's point of view, however, Sir Michael Foster's greatest work was the introduction of the species *cypriana* for use in hybridizing. Coming from the dry climate of Asia Minor, this species is of a taller growth and larger flower than *pallida*, and, instead of having the stiff stems characteristic of the *pallida* varieties, its flowers are borne away from the main stem on graceful bending stalks. The five varieties of Sir Michael Foster which show these characteristics are Caterina, Crusader, Lady Foster, Shelford Chieftain and a few others, all of which have lately been offered in this country. They are all of them very beautiful, but unfortunately they seem to have inherited from their parent *cypriana* a delicacy of constitution which renders them rather susceptible to rot in our wet seasons, and it is evident that we must use them for breeding

rather than as permanent garden plants, for in our Northern gardens extreme vigor is the most important quality. Sir Michael Foster also used the species *kashmiriana*, and from it believed that he had given us two varieties, Kashmir White and Miss Willmott, really white triumphs. In this country, however, these also are a little "finicky as to their likes and dislikes, and it is interesting to know that recently their parentage has been questioned by other breeders, who believe they are not descended from *kashmiriana* at all, but from *cypriana*. It seems curious that a man of Sir Michael Foster's standing should have made such a mistake, and the question opens up a larger question as to the status of some of the collected forms which he used in his breeding.

Inspired by Sir Michael Foster's work, Caparne on the Island of Guernsey began in the 80's or 90's to force into bloom some of the later-blooming strains of Iris and to cross them with the early flowered dwarf species from the Alps. The result was a new race intermediate in bloom and intermediate in height between the two most valuable in our gardens, and which comes into bloom in Philadelphia usually about the middle of May, lasting for several weeks. Caparne is dead, and the details of his work are hard to trace, but we know that before 1902 he offered nearly a hundred of these Intermediates, most of which have disappeared from cultivation, but among them are the varieties Diamond, Dauphin, Dolphin, Ivorine, King Christian, and Royal which have reached this country within the last five years or so and can still be found only in a few catalogues. An interesting fact to note here is that Caparne sold a large collection of these Intermediates probably about 1900, or later, to Goos & Koeneman, of Niederwallaf, Germany, and that about 1910 this firm sent to America a set of Intermediates, including Fritjof, Halfdan, Helge, Ingeborg, and Walhalla, which were introduced here by Dreer and by Farr, and have become very popular. Whether these are actual Caparne varieties renamed, or seedlings of them, is not known, but anyone who grows the two sets side by side will be struck by the fact that they are in their characteristics as like as two peas in a pod. I do not wish

to say that Goos & Koeneman sent these out with any intention of deceiving, for it was their full right to buy unnamed seedlings from Caparne and to name them, but the fact remains that in America they are given the credit of introducing an Intermediate race, a credit which rightfully belongs to Caparne. While speaking of Goos & Koeneman I may mention that they have given us a set of late-blooming Iris for which they are deservedly famous, among these being such varieties as Iris King, Rhein Nixe, Gagus, Fro, and Loreley.

The only other breeders of note in this early period of which we have record at present are Verdier, in France, whose earlier varieties seem entirely lost to commerce, or at least are not known in America, but who is known for the varieties which were introduced after his death by the firm Vilmorin-Andrieux. Among these later varieties are Mercedes, Prosper Laugier, and LaNeige. Reuthe working in England between 1885 and 1900 introduced a dozen or fifteen varieties, practically all of which are now superseded except Mrs. Neubronner.

We come now to what may be known as the modern breeders, all of whom owe their inspiration to Sir Michael Foster, and who have followed his footsteps. In France the Vilmorins have since 1900 given us increasingly good varieties, beginning with Tamerlan and Oriflamme. They have in their breeding constantly used Amas, and of later years also *trojana*, with the result that their varieties are known for their very large flowers. Unfortunately with this size some of them have inherited somewhat of a sparseness of bloom, but in all plants this tends to be the rule, and perhaps may be overcome by future breeders. Among the smaller varieties introduced are Eldorado, Archeveque, Ambigu, Dejazet and Opera, all of which are very rich in their coloring and which are only small in comparison to such giants as Alcazar and the new Ambassadeur and Magnifica which have been introduced this year. This breeding work was begun by Phillippe de Vilmorin in the late 90's and has been, carried on of recent years by S. Mottet. In their trial gardens thousands of seedlings are being tested yearly. The Vilmorin Nurseries are not far from Paris, and near them is located the

firm of Cayeux & LeClerc, which, like Reuthe, have sent out a number of varieties which are now almost entirely forgotten but among which Petit Vitry and Mme. Blanche Pion stand out prominently and will continue to be admired for many years. Near Paris also is the firm of Millet et Fils, where Iris breeding has been going on for some 20 years or more, and with a definite ideal in view, namely, freedom of bloom. In their fields it is quite noticeable that their varieties contain many more flowers to the plant than the varieties of most breeders, and in contrast to some of the sparser blooming giants of the Vilmorins this freedom of bloom is particularly noticeable. Millet has raised but one exceptionally large Iris, Souv. de Mme. Gaudichau, a very rich deep-purple for which he will certainly become as famous in this country as he is now in Europe. His other varieties are not small, the best of them being Corrida, Bianca, Ivanhoe, Atlas, Romeo and Colonel Candelot. These have been introduced within the last ten years and are quite well known in Europe, but apparently not in this country. At the south of France is an amateur breeder who has done a great work in raising Irises for his climate. M. F. Denis lives near the town of Cette on the Mediterranean, and he found over 30 years ago that the standard Irises of that day did not give as large flowers in his climate as he desired. Inspired probably by Sir Michael Foster to search for an Iris to use as a parent from which to get size he finally chose *Iris Ricardi* from Palestine. This close relative of *cypriana* and *mesopotamica* stands 4 feet in height with very large flowers of a poor form and color; but M. Denis has been able to combine its size with the good form and the coloring of the standard varieties, and for his climate he has produced what might almost be called miraculous results, for his varieties are twice as big as the standard varieties. It is unfortunate, however, that this *Ricardi* parentage brings with it a trace of tenderness or lack of vigor, so that some of these varieties do not flourish well at the North. A few of them in fact are absolute failures even in Paris where the attempt to grow Mme. Claude Monnet has been given up by the nurserymen there, as the plants weaken and die. Other varieties of his, however,

which apparently have as much *Ricardi* parentage, flourish in Paris and in England, and appear to do well in this country, among them being Dalila and Mme. de Sevigne. It is evident, therefore, that no general rule can be drawn about hybrids of this species, but that they must be tested one by one, and in this lies the hope that we can bring to this country some of his most beautiful achievements and that if they do not succeed we can at least breed from them to get further seedlings, retaining their good points without their tenderness. Most of his varieties are as yet not in the trade, although some of them have been grown by him for nearly twenty years, and they run largely to smoky blended colors which are not as a rule good for garden effect, although very beautiful singly at twilight.

In England the seedlings of Yeld have lately taken on considerable importance, and they have been very much admired in this country. The characteristic of all his seedlings is their extreme vigor, which is much welcomed by the gardener who has struggled with some of Sir Michael Foster's seedlings or some of the Denis *Ricardi* seedlings. Lord of June is one of the most beautiful of all Iris and of very large size, and Neptune and Halo and one or two others approach it closely. In yellows is Dawn, which is a variety which will be valuable for years to come. Sir Arthur Hort, near London, has for some years been trying to improve on Sir Michael Foster's seedlings in their size, and his seedlings of Caterina are glorious to behold, several of them being as big as Vilmorin's Magnifica. As they grow in England, these are apparently vigorous and free blooming, but the few plants that have reached this country have not yet been a success. His varieties and those of Yeld and Mr. Bliss, of whom I shall speak next, have all been introduced to the trade by R. W. Wallace of Colchester, who himself is also growing a number of seedlings of great promise.

The greatest English breeder of modern times is Mr. A. J. Bliss of Morwellham, Tavistock, Devon. He has been breeding Iris for 20 years, first for the scientific purpose of determining the parentage of our existing garden varieties, with results which have corroborated the belief of Mr. W. R. Dykes that but

two species, *pallida* and *variegata*, were responsible for all varieties in cultivation before 1890 or 1900. During the past ten years, however, Mr. Bliss has been endeavoring to produce new and beautiful varieties. He has been more successful than any other breeder in giving us varieties combining height, size, freedom of bloom and vigor of plant in practically all colors, and unlike other breeders he has not stuck to one ideal and produced merely one type of flower, but has produced all the types of Iris flowers. Of the 10,000 seedlings he has raised about 70 have been retained for further testing, and with these a dozen or twenty have been introduced to the trade in England, and a few are now appearing in this country. It will take further testimony to prove which are his best varieties, but Dominion has won a place for itself in England which no other Iris has ever reached, and he has other equally sensational seedlings with apparently the same parentage. This parentage, by the way, it is interesting to note must have something in common with of the Vilmorins' Ambassadeur and with Mr. Williamson's Lent A. Williamson, because these three varieties, produced in three different countries almost simultaneously, have very much in common in their growth, form, substance and texture, although different in color. The other varieties of Mr. Bliss which have already been introduced in England are not this same sensational character, but they are all distinct advances on existing varieties, and will in time, I am sure, displace many of our best sorts. Among them are Sweet Lavender, Cretonne, Camelot, Ben Bow, Tom Tit, Knysna, and Syphax, all of which are distinct advances in their respective types. We may expect much of Mr. Bliss' work in the near future, for he has passed the first stage of experimenting, has proved or disproved certain theories of genetics in regard to Irises, and is now advancing with considerable certainty toward definite goals.

All of the Irises of European breeders noted above have been successful in their native countries, but it is always a question as to how well they do will when transplanted to America, and therefore it is necessary that they should be tested here rather than taken on faith on their European performances. We have

fortunately in this country a large number of persons who are breeding Irises systematically, and from them we can expect a great deal as they are working in the different climates of this country where their varieties will be used in gardens. The pioneer of all breeding work, as of other Iris work in America, is Bertrand H. Farr. It was the collection which he introduced from the Barrs about 1905 which gave the first impetus to Iris growing in America, and in 1909 he introduced a set of seedlings for which he at once became deservedly famous. He has continued year by year to give us seedlings—occasionally very good ones, and often not so good,—among which stand out Quaker Lady, Montezuma, Juniata, Mary Garden and half a dozen more, will be grown in American gardens for many years to come.

The most scientific work of breeding Iris in this country has been done by Miss Grace Sturtevant, Wellesly Farms, Massachusetts. She has not worked on a large collection of Iris as has Mr. Farr, but, on the other hand, she has had in her small collection nothing but the very finest, and the seedlings which she has given us during the last few years are of wonderfully high quality. Like the seedlings of Bliss, they combine size and freedom, and moreover, almost without exception they are very vigorous in this climate. From the great number which she has introduced during the last few years it is hard to choose the best, but it seems certain that Afterglow, B. Y. Morrison, Queen Caterina, Reverie, and Shekinah will survive for many many years to come, and will bring her increasing fame as they become known over this country and Europe.

The only other large producer of American seedlings is Mr. W. E. Fryer, of Mantorville, Minnesota, who has produced a race of seedlings which he says in his climate are superior to any of the European varieties which he has tried. As seen in the East, unfortunately these varieties have not created a very good impression, it being the consensus of opinion that they are much too close to existing sorts, and in most cases not superior to them; and therefore it would not appear that most of them and therefore it would not appear that most of the are worth

cultivating in the climate of the Eastern United States or Europe; but it may be that in the cold Central and Northern States they will succeed better than varieties which have been raised in milder climates. The seedlings are still too new for these points to be settled, and we must wait for further evidence, but on their showing so far in the East, those gardeners who have known the best European Irises have felt certain in their own minds that Mr. Fryer had not seen the best of the modern European varieties when he named so many of his seedlings.

It would not be right to finish this short sketch without mentioning that there are at least a dozen amateur or semi-amateur Iris breeders who are just becoming known in this country. Most of them have not introduced many Irises into the trade as yet, but from these breeders I feel certain that we shall in a few years hear much, as they are beginning to produce varieties of real merit. Mr. Williamson ranks first among these, for his one variety, *Lent A. Williamson*, is all that is necessary to make his fame secure for many years; and we can only hope that he will give us others of equal merit. Mr. J. M. Shull and B. Y. Morrison, of Washington; Mr. E. M. Andrews, of Boulder, Colorado; Mr. William Mohr, of Mt. Eden, California; Mrs. C. S. McKinney, of Madison, New Jersey, A. P. Saunders, Mrs. Cleveland and many others, are producing seedlings that in a few years are certain to be of importance, and we can only wait with impatience until it is possible for us to secure these and try them in our gardens.

A brief sketch such as this can merely call attention to the three points; first, the very small knowledge we have of the early breeders, which knowledge we hope may shortly be increased by the research of our European friends; second, the little knowledge of Iris genetics which most of these breeders up to the present day have had to help them in their work; and thirdly, the fact that to-day the Iris breeder has more such knowledge at hand than any previous breeders, and not only that, but he has a better race of varieties to work from, which two new features should make it possible for the breeders of the present and future to give us distinct and unheard of advances

during the next ten or twenty years. From what I have seen and heard I feel convinced that we are just on the threshold of very great improvement of this beautiful flower.

JOHN C. WISTER.

BOTANIZING AT BLACKSBURG, VIRGINIA

During a vacation period of two weeks spent at Blacksburg, Virginia, during the latter half of July, 1920, the writer made daily botanical excursions into the surrounding fields and woodlands and secured much information of importance, as well as a considerable number of specimens for the Garden herbarium. On account of the unusually rainy weather, fleshy fungi were abundant and claimed a large share of his attention. A list of the fungi found will be published in *Mycologia* for November.

The first find of particular interest was *Daedalea juniperina*, growing on a red cedar stump near Kanode's Mill, three miles west of Blacksburg. This very rare species had been previously found on red cedar in Kansas, Missouri, Kentucky, and South Carolina. *Tremella sparassoidea*, recently figured by Overholts in *Mycologia*, was collected beneath a white oak tree in Preston's Woods, one mile west of Blacksburg, on July 21; while on the same excursion it was discovered that the beautiful yellow bolete, *Ceriumyces retipes*, is much too bitter to be used for food, although *C. griseus*, a very near relative, is always nutty and sweet.

Hexagona alveolaris was found in abundance in Broce's Woods on fallen branches of hickory, which it had doubtless killed. This fungus may have to be reckoned with in growing walnuts, hickories, and pecans on a commercial scale. Another parasitic polypore abundant in the same grove was *Elfringia lobata*, a large bracket-fungus attacking especially the white oak, but found also on hickory, red maple, etc. Its nearest relative, *Elfringia megaloma*, so common in the North, is very rare at Blacksburg. *Hydnum erinaceum* was found in a decayed spot on the trunk of a living hickory.

Interesting observations were made on the food of the common box tortoise, which is abundant in that locality. As long as

Vaginata vaginata, a common mushroom growing on the ground in woods, was plentiful, the tortoise seemed to eat nothing else. *Russula virescens* was his second choice. Squirrels carried mushrooms to stumps and trees, but the tortoise devoured them in place, stem and all, leaving characteristic "chips" as proof of his presence.

A man came to me July 25 and asked me to look at a "gum tree with acorns on it." It proved to be the shingle oak, *Quercus imbricaria*, the only specimen I know in the vicinity of Blacksburg.

On July 27, I went to Brush Mountain and found the flora on the subcarboniferous shales and sandstones quite different from that on the Trenton limestone nearer Blacksburg. Several interesting fungi were added to my list. By the roadside near the foot of the mountain, a large patch of *Centaurea maculata* was found growing. This attractive weed has been introduced from Europe into many parts of the eastern United States.

Another exceedingly attractive introduction found in low clay soil along roads was the Venetian mallow, or flower-of-an-hour, *Hibiscus Trionum*, which can be highly recommended for use in design because of its decorative foliage, flowers, and pods. The blossoms are five-parted, creamy-white with purple center, orange stamens, and scarlet stigma.

Poison ivy was found commonly, as elsewhere, but a very stubborn case of poisoning was observed in which none of the ordinary remedies, like baking soda for example, seemed to give any relief. Potassium permanganate was also tried without a cure, but it was discovered that this treatment was being improperly applied. When the crystals were diluted with 2,800 parts of water and the solution prepared fresh every twelve hours, the sores that were bathed in the liquid disappeared in a few days.

In connection with the subject of poisons, I might mention an experiment I tried with flies on fresh specimens of *Venenarius colturnatus*, a mushroom similar in its poisonous properties to the fly agaric. Some one has stated that flies are often only stupefied for a time by sucking certain mushroom juices and

that they afterwards come to life and fly away. By various experiments I determined that flies killed by this particular mushroom remained dead under observation for at least 24 hours, which must be a considerable length of time for a fly, and were found dead in the packets with the fungi a month later.

During the last week in July, I attended several meetings of delegates from various state corn and canning clubs, in session at the Virginia Polytechnic Institute, and was very agreeably surprised at the interest displayed by the youngsters in farming. There were 110 boys and 48 girls in attendance, in addition to a hundred or more from the immediate vicinity.

W. A. MURRILL

NOTES, NEWS AND COMMENT

The following visiting botanists have registered in the library during the summer: Professor H. D. House, Albany, N. Y., Mr. P. L. Ricker, Mr. G. F. Gravatt, Dr. J. N. Rose, Dr. B. O. Dodge, Mr. C. L. Shear, Mr. F. C. Meier, Mr. C. V. Piper and Mr. Walter Swingle, Washington, D. C., Professors Melvin R. Gilmore and Norma E. Pfeiffer, North Dakota, Professors L. H. Bailey, H. M. Fitzpatrick and Mr. H. E. Stork, Ithaca, N. Y., Mr. L. J. Pessin, Baltimore, Md., Professors John W. Harshberger and class and Dr. John Y. Pennypacker, University of Pennsylvania, Professors A. A. Tyler, Decatur, Ill., H. S. Jackson, Lafayette, Ind., Charles J. Chamberlin, Chicago, Ill., Alexander W. Evans, New Haven, Conn., Ira D. Cardiff, Yakima, Wash., and M. Akemine, Sapporo, Japan, Mr. Arthur F. Fischer, Manila, Philippine Is., Mr. Joseph T. Rock, Honolulu, Hawaii, Señor L. Rodriguez, Paris, France and Professor F. S. Earle, Cuba.

Dr. W. A. Murrill represented the Garden at the second field meeting of plant pathologists held in the Shenandoah Valley and northward, August 2-7, for the study of fruit diseases, which was attended by from 75 to 100 experts on plant diseases from various countries. A general account of this important

meeting will appear in a future number of the JOURNAL, and a more technical paper will be prepared for the January number of *Mycologia*.

Dr. Murrill addressed the members of the Garden Club of Suffern, New York, August 24, on "Edible and Poisonous Fungi." The railway journey was brightened by a wonderful display of the swamp rose mallow in the marshes north of Jersey City. This large and very showy plant flowers in this latitude in August and September, and may be seen in abundance in the coastal marshes from Massachusetts to Florida. Plants of the crimson-eye rose mallow, often scattered among the others, may be readily distinguished by their white flowers, with crimson center, and their long-pointed fruit-pods.

Duplicate specimens of marine algae to the number of 3,406, chiefly West Indian and more particularly Bahamian, were distributed during the month of June. They were made up in twenty-one sets and were sent to various institutions in the United States and Europe, especially to those in which studies of the marine algae are being carried on and with which exchange relations have been established.

Much progress was made throughout the summer in the preparation of the site in the Horticultural Garden for the new Iris Garden, and planting of several hundred kinds of Iris to be contributed by the American Iris Society was commenced in August. The work included path-construction and grading and was accomplished by the aid of the Special Development Fund contributed by members of the Garden. Paths connecting the new Iris Garden with those of the Herbaceous Garden to the north have been built as well as one leading to the Rose Mallow collection to the south. The path overlooking the Rose Garden from the west and south partly built last autumn was completed in May and affords fine views of this plantation, most attractive in June during the period of maximum bloom.

Mr. Kunihiro Okura, president of the Okura Paper Company, of Tokio, Japan, recently presented the museum with a number of articles made of "Papier-Silk." The Papier-Silk is a substitute for real silk. The material is made by using natural silk for warp and silk paper yarn for woof. The silk paper yarn is obtained from a native Japanese plant known as *Edgeworthia papyrifera* which is now extensively cultivated on the mountain slopes of Japan and used for paper pulp and yarn. In making the yarn the fiber is first made into a very thin paper. This is cut into ribbons of different widths and then by machinery spun into yarn. Cloth made from this material has a very fine texture and was formerly worn only by noblemen of high rank in Japan. It is only recently that an attempt has been made to commercialize and popularize the industry.

Dr. Jonathan Dwight contributes the following interesting note on the Linnaean Botanical Garden, at Upsala, Sweden: In the lower end of Svartbacksgatan at Upsala is the old botanical garden of Carl von Linné which has been nearly abandoned for about a century. This was the spot where the Flower-King spent most of his time among the plants, etc., where the grass thrived and trees grew tall. The Egyptian Antiquities from the Victorian Museum have reposed there for some time in part in his hothouse and part in the Museum for Northern Antiquities. A change has of late taken place in the old garden. Some of the old trees have been cut down, the well cultivated lawns are elevated, and Linné's lily ponds (which are seen in old copperplate engravings of his "Hortus Upsaliensis") have been rebuilt in their location. The young men of the old Linnean Society have accomplished this change and renovation. Linné's greenhouse and the foreground have as yet not been restored. This fall, however, the Museum of Northern Antiquities will be moved to "Gustavianum" and then the house will be arranged for a Linnean Museum. Professor Svedelius informs the public that a large donation has been received by the Linnean Society for a new home for the Director. As soon as it is ready the

Linnean Society will take possession, and also of the Linné House, where the expensive collections of furniture, books, bric-a-brac, etc., which were the belongings of Linné will then be moved. The greater portion of these have been heretofore kept in the Linné house in Svartbacksgatan.

Meteorology for August.—The total precipitation for the month was 7.49 inches. The maximum temperatures recorded at the Garden for each week were 91° on the 8th, 89° on the 12th 91° on the 17th, 84° on the 27th and 87° on the 30th. The minimum temperatures were 55° on the 3d, 65° on the 12th, 55° on the 20th and 56° on the 28th.

ACCESSIONS

MUSEUMS AND HERBARIUM

484 species of flowering plants from Oregon. (Collected by Professor M. E. Peck.)

2 specimen of *Vaccinium crassifolium* from North Carolina. (Given by Mrs. H. A. J. Wilkins.)

161 species of flowering plants from Jamaica, West Indies. (By exchange with the Royal Gardens, Kew, England.)

8 colored lantern slides of dahlias. (Prepared by Miss Fleda Griffith.)

315 specimens of flowering plants from Indiana and neighboring states. (By exchange with Mr. C. C. Deam.)

45 photographs of cacti. (By exchange with the United States National Museum.)

2 uncolored lantern slides of dahlias. (Prepared by Mr. Carl Riedlbauer.)

6000 specimens of flowerless and flowering plants from Trinidad, West Indies. (Collected by Dr. and Mrs. N. L. Britton, Miss Dorothy Coker, and Dr. T. E. Hazen.)

18 specimens of *Penstemon* from Colorado. (Given by Professor Ellsworth Bethel.)

1 specimen of *Synthyris* from Alaska. (By exchange with the United States National Museum.)

1 specimen of *Panax* from Pennsylvania. (Given by Mr. William Trimble.)

1 specimen of *Penstemon* from Oregon. (Given by Mr. J. C. Nelson.)

3 specimens of *Syntheris* from Colorado. (Given by Professor Ellsworth Bethel.)

1 specimen of *Penstemon australis* from South Carolina. (By exchange with Dr. C. A. Ludwig.)

2 colored lantern slides of *Kalmia latifolia*. (Given by Mrs. N. L. Britton.)

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JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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REPORT BY THE DIRECTOR-IN-CHIEF UPON A VISIT TO BOTANICAL INSTITUTIONS IN ENGLAND

TO THE SCIENTIFIC DIRECTORS OF THE NEW YORK BOTANICAL
GARDEN.

Gentlemen: By permission of the Board of Managers, I was absent from New York during the period August 7 to October 12, 1920, engaged in botanical studies in England, accompanied by Mrs. Britton. Nine years had elapsed since our last visit to Europe, and many problems had arisen in the course of our work in development, installation and investigation which an examination of the older English botanical establishments, and studies of their collections could not fail to be helpful in solving; we have brought home with us notes and impressions which will be useful in many ways and have arranged for exchanges of duplicate plants and specimens of value to our collections.

Most of our time was, naturally, spent at the Royal Botanic Gardens at Kew, still the most important botanical institution in the world; it was a very great pleasure to learn, at first hand, that the exigencies of war had not been permitted to effect deterioration of this great treasure-house of information concerning plants so vitally important to civilization. Sir David Prain, Director, was in Scotland on vacation during the first part of our visit, but returned before we came away; we were cordially welcomed by Captain Arthur W. Hill, Assistant Direc-

tor, and by others of the staff. We found all parts of the establishment, grounds, plantations, greenhouse collections, museums, library and herbarium in excellent condition and all considerably developed. Our delight at returning was sadly marred by learning of the death, a few days before, of our very dear old friend, J. G. Baker, for many years Keeper of the Kew Herbarium and a distinguished contributor to botanical literature.

The summer had been wet and cold in England and the autumn continued cold and cloudy. Vegetation was luxuriantly green. Kew gave one the impression of a level velvety green carpet from which arise trees, shrubs, flower-gardens and buildings. Security of the plantations and labels and a high degree of order and neatness is effectively secured by the solid brick wall about ten feet high which surrounds the whole reservation of about 270 acres, broken by six entrances for pedestrians only, closed after sunset; admission charges are an innovation since our last visit, one penny on five days, six pence on two days of the week. Many trees had made notable growth since our last visit, and the arboretum had been enriched by rare species. We were especially interested to see the specimens of *Nothofagus*, relatives of Beeches, from extreme southern South America, growing vigorously and to learn that *Nothofagus obliqua* is one of the most rapid-growing of hardwood trees. They are of quite different aspect and have leaves different from those of any true Beech, but their fruits are similar to beechnuts; the trees might, perhaps, be hardy in some part of the southeastern United States. The Chinese Tulip-tree (*Liriodendron chinense*), of fascinating interest to us as a very close relative of our own *Liriodendron Tulipifera*, inhabiting the eastern United States, but smaller, had grown into trees some twenty feet high, their foliage almost indistinguishable from that of their American congener. I was fortunate in being at Kew for an afternoon with my friend, Dr. A. Henry of Dublin, whose profound knowledge of trees puts him in the highest rank of dendrologists, and he told me many things. He pointed out to me the great desirability of initiating experiments on a large scale in hybridizing forest trees in order to get the advantage of the more rapid

growth of selected hybrids than that of either parent, and suggested international coöperation, as he believed that better results from such experimentation could be obtained at some point in the southern United States than elsewhere; the topic interested me greatly, because the possibility of obtaining an increased yield of paper-pulp from hybrid poplars had already been brought to our attention at home.

The wealth of shrubbery at Kew, as elsewhere in southern England, makes one envious of the climatal conditions which render it possible; the evenly distributed rainfall, the cool summers and the mild winters provide a combination of conditions through which a great variety of shrubs from warm-temperate regions may be grown to perfection, and many of them are of great beauty and of high botanical interest. This season the roses were in elegant bloom during August and until late September; the installation of the Rose Collection at Kew, with plots alternating with clipped holly trees, a clipped holly hedge forming a semicircular background, is very striking. Mrs. Britton took notes on all the varieties in bloom during our visit, much aided by data kindly supplied by Mr. John Coutts, the foreman in charge. The Rhododendron and Azalea plantations at Kew have been greatly expanded in recent years, along both sides of a path several hundred feet in length, forming a wonderfully attractive mass of evergreen foliage in the autumn.

The herbaceous plantations shared the general luxuriance of the woody plants. The collection of *Kniphofias* (Red-hot Pokers) was of especial interest, many kinds being in maximum bloom in September, and were pronounced by Mr. J. Burt-Davy, who is at Kew with Mrs. Burt-Davy, occupied in writing a Flora of the Transvaal, to be more elegant than they are in the wild condition in South Africa. Hollyhocks, Snapdragons, Campanulas and Pentstemons were in perfection in large masses. The systematic herbaceous collections contained many plants we had never seen in bloom before, many of them from southern regions, none perhaps more beautiful than the Michaelmas Daisies (North American Asters), represented by numerous species, and the American Golden-rods. Of particular interest

to us were two of the wild species of *Dahlia*, reminding us of the great collection of Dahlias brought together by our Dr. Howe, now in full bloom at home.

The famous Kew rock-garden was as fascinating as ever, with its great number of species; it has been modified recently by the elimination of some trees and tall shrubs which were casting too much shade for the conditions of low sun and prevalent cloudy weather. Here, as in many other rock-gardens, species not naturally living among rocks are freely admitted in order to increase the variety of plants shown. It was quite unexpected for example to see the North American Turtle-heads (*Chelone*), and our blue *Lobelia*, plants typical of wet woodlands and swamp-borders, growing among dry rocks at the top of a slope!

The collections under glass were as instructive as ever, and many species were here also seen by us for the first time. The *Danaea* ferns recently sent by Mr. W. G. Freeman from Trinidad are noteworthy accessions and reminded us of our study of them in the mountain forests of that island earlier in the year. Many of the Cycads and Palms had made notable growth during nine years and additional species had been brought in. Professor Charles J. Chamberlain, of the University of Chicago, spent some days at Kew in prosecution of his noteworthy Cycad studies, and we discussed this family in some detail; he had attended the meeting of the British Association for the Advancement of Science held this summer at Cardiff; we agreed that a new illustrated taxonomic monograph of the Cycadaceae is a great desideratum, the species of the tropical American genus *Zamia*, the West Indian and Floridian representatives of which we have brought into our New York collections in many good specimens, are still incompletely described, while those of continental America from Mexico to Peru are very imperfectly known. Everyone at all familiar with Palms knows that a modern monograph of the Palmaceae and their enormously important products would be a great boon to science and to economics; I had recently discussed this topic with Professor L. H. Bailey and with other experts; the Kew collections and

our own would form a basis for an investigation which might lead up to such a monograph, supplemented by field and garden studies in the American and Old World tropics, requiring several several years' work by trained investigators and collectors, comparable with the investigation of the Cactus Family by Dr. J. N. Rose and myself supported by the Carnegie Institution of Washington, the results of which are now in course of publication. Professor T. D. A. Cockerell of the University of Colorado and Mrs. Cockerell were studying at Kew and at the British Museum and we talked with them frequently on matters of mutual interest; he was engaged in classifying the collection of fossil insects at the Museum; Mrs. Cockerell was continuing studies in plant breeding.

I studied the Cactus Collections at Kew in considerable detail and obtained from them much information which will be of value in the completion of our investigation. A copy of the second volume of our monograph, published in Washington on September 9, reached me in time to consider it, as well as the first volume, with Mr. R. A. Rolfe, the member of the Kew staff who has the herbarium collection of cacti in charge, and we examined every specimen there; he rearranged the collection in accordance with the treatment of genera included in the two published volumes, after I had annotated the determinations of the species and named up the undetermined specimens, which were quite numerous. The Kew collection is very incomplete. I proposed that we prepare specimens from our great series of living plants and send them to Kew in exchange for other material, in order that a good representation of the species may be available there for study, and this proposition was cordially accepted by Sir David Prain. I also annotated determinations of names upon a large number of the living cacti, and we may advantageously supplement that collection by cuttings from ours. We are indebted to Mr. William Taylor, foreman in charge of the Kew Succulent House for aid and information, especially in examination of cacti of the genus *Rhipsalis*. We had the pleasure of meeting Professor R. Chodat of the University of Geneva, who had been attending the meeting of the British

Association for the Advancement of Science, and who had aided our studies of Cacti by specimens and notes obtained by him in Paraguay a few years ago.

The great orchid collections at Kew, living plants, herbarium specimens, paintings and sketches, is one of the most important assets of the establishment. Mr. Rolfe has been a diligent student of Orchidaceae for over thirty years and his knowledge of them is profound; he retires soon from the Kew staff in accordance with the age limit of 65 of the British Civil Service; he has a great desire, upon his retirement, to make a critical study of the orchid herbarium formed by the German student Reichenbach, which it will be remembered was, in accordance with his instructions, locked up and thus withdrawn from study for a period of twenty-five years after Reichenbach's death some thirty years ago, thus preventing all recent orchid students from knowing with certainty just what species the German had described in his voluminous writings. One can scarcely imagine a scientific man taking a course so despicably unscientific; it is important, however, that the collection be studied by orchidologists and it is now available in Vienna.

I am indebted to Mr. S. A. Skan, Librarian at Kew, for much bibliographic information; the collection of botanical books is wonderfully complete and in admirable order, but one has to learn the location of books upon the shelves in order to use the collection rapidly. Through expenditure of a portion of our Special Development Fund of 1920, subscribed by members, I was enabled to purchase from London booksellers a considerable number of rare volumes needed in our library, and Mr. Skan gave me valued advice as regards some of these purchases. Dr. Barnhart will make a detailed report upon these accessions. In this connection, the present is a favorable time for obtaining rare books at reasonable prices; the expenditure of several thousand dollars within the next year would be an excellent investment.

One of my principal objects in visiting English botanical institutions at this time was to obtain determinations of a large number of specimens from northern South America in our own

collections, by comparison with named specimens at Kew, at the British Museum of Natural History and in the herbarium of Linnaeus preserved at the rooms of the Linnaean Society of London; this errand was in connection with the investigation of the Flora of northern South America now being prosecuted by us in coöperation with the United States National Museum and the Gray Herbarium of Harvard University. For this purpose I selected and took with me in two large chests several hundred unnamed herbarium specimens, collected mainly by Dr. Rusby and Dr. Pennell in Colombia in 1917-1918, by Dr. Rose in Ecuador in 1918, by Mr. Pittier in Venezuela in 1918, and by ourselves in Trinidad early in 1920. I was fortunate in obtaining for this somewhat heavy piece of work, the nearly continuous aid of Mr. N. E. Brown, formerly of the Kew staff, now retired. We succeeded in making nearly all the comparisons needed, but I left a few specimens with Mr. Brown for further investigation. The results of our studies showed us conclusively that many species new to science are included in the collections already made; the English collections from these regions are large, but incompletely worked up, so that while in many cases we were able to match specimens we were unable to find published names for them. Some further determinative comparisons may, doubtless, be made at the herbarium of the Jardin des Plantes in Paris, and by favor of Captain Hill, some specimens were transmitted to Professor Lecomte, Director of the Paris institution, with a request for comparisons to be made there and the results communicated to me at New York; the specimens sent were Scrophulariaceae, a family now under study by our Dr. Pennell. I also took notes upon the sedges of northern South America in the Kew collections as written up by the late Mr. C. B. Clarke, who studied them for many years, for future use in cataloging them; his monograph of this family remains unpublished. Mr. Brown showed us, at his home, the very complete collection of South African Mesembryanthemums which he has brought together after many years' effort, for illustration and descriptions; we arranged with him for obtaining a series of photographs of these wonderful plants.

Other members of the Kew staff aided me in various ways. Mr. T. A. Sprague, who made a trip into Colombia and Venezuela some years ago, helped with some determinations and I discussed botanical nomenclature with him in some detail, he being now occupied in the publication of the fifth Supplement to the invaluable "Index Kewensis" and we also appreciate aid and suggestion from Dr. Otto Stapf, Mr. C. H. Wright and Mr. John Hutchinson. We talked at some length with Miss M. Smith, botanical artist of Kew, relative to her long-continued work upon the illustrations for the *Botanical Magazine*: increased cost of publication has recently made necessary the issuing of fewer plates annually, as in the case of our *Addisonia*.

A call at Kew by Sir Daniel Morris gave us opportunity to meet him and to engage in pleasant reminiscences. It will be recalled by those familiar with the early years of development of the New York Botanical Garden, Doctor Morris, then Assistant Director at Kew, gave us much valued advice, and that he delivered one of the first of our public lectures, on "The Royal Botanic Gardens at Kew," at the American Museum of Natural History on the evening of December 17, 1895. During his subsequent long service as Commissioner of Agriculture for the British West Indies, he aided us frequently in various ways. After his retirement from active service some years ago he served as a member of several important boards and commissions and is still keenly interested in the horticulture of southern England. We learned with much interest of the progress of bibliographic work in the preparation of a new edition of the "Iconum Botanicarum Index" undertaken in 1913 by the Royal Horticultural Society in coöperation with Kew, the British Museum and other institutions, now approaching completion; the appearance of this reference catalogue of some 250,000 published illustrations of plants is eagerly anticipated.

We had a delightful evening with Dr. A. D. Cotton, formerly of the Kew staff, now mycologist of the Board of Agriculture, and Mrs. Cotton; we discussed the possibility of making the recently established journal *Botanical Abstracts*, published in the United States, a truly international record of current botanical

literature, to occupy the place of the *Botanisches Centralblatt*, now deceased, of which Dr. Cotton had been one of the editors. We also met Mr. J. S. Gamble, well known from his investigations of the flora of British India, who is occupied in the writing and publication of his "Flora of the Madras Presidency." Unexpected pleasures were experienced in escorting Professor F. S. Lee, of our own Board of Managers, with Mrs. Lee and their children through Kew on one afternoon and Mr. E. V. Z. Lane of our Corporation with Mrs. Lane on another.

Most of Mrs. Britton's time at Kew was devoted to studies of the Moss Collections with special reference to her work upon the West Indian species. Notes were taken upon all the Trinidad moss specimens preserved at Kew, for use in determining the large series collected by her in the forests of that island, and she was able to supply names and annotations for many others; Mr. A. N. Dixon made a short visit to Kew and consulted with Mrs. Britton about the West Indian and South American mosses and also arranged for an exchange of duplicate specimens.

At the British Museum of Natural History I made examinations and comparisons of many specimens, aided especially by Mr. William Fawcett, who is continuing there his studies on the flora of Jamaica, based largely upon specimens collected on that island by Mr. William Harris through our coöperation extending over several years with the Jamaica Department of Agriculture, and by myself and Mrs. Britton; the results of this investigation are appearing in a series of volumes written by Mr. Fawcett and Dr. A. B. Rendle, head of the British Museum Department of Botany, entitled "The Flora of Jamaica," published by the trustees of the British Museum; a copy of the third published volume of this valuable work had reached me just before I left New York. Messrs. Fawcett and Rendle desire that the volume to contain descriptions of the Ferns and their allies, the mosses, and the hepatics be written by Mr. Maxon of the United States National Museum, by Mrs. Britton, and by Professor Evans of Yale University respectively; Mrs. Britton accepted their invitation as regards the Mosses. Dr. Rendle kindly proffered aid in our South American studies and will

send us some duplicate specimens in exchange; he had already supplied us a few years ago with a valuable series of specimens collected by Hartweg in Ecuador and Colombia. Dr. H. F. Wernham and Mr. Edmund Baker of the Museum staff aided in comparing specimens, and I met Mr. Spencer Moore, who had supplied me with data concerning some Brazilian Cacti collected by him several years ago. I talked with Mr. James Britton, formerly of the Museum staff, now retired, relative to the publication of the *Journal of Botany*, of which he has been editor for many years; advanced costs of printing, unassociated with increased circulation, are seriously threatening the continuation of this periodical, founded in 1863.

We greatly enjoyed two days at Oxford under the guidance of Dr. G. Claridge Druce and Professor S. H. Vines. The ancient botanical garden of Oxford University, some 300 years old, and the first botanical garden established in England, is a Mecca for all students of plants; here we came in touch with the beginnings of botanical science and with the records and traditions of its progress in the enlightenment and civilization of mankind. To walk the paths traversed by Morison, Dillenius, Sherard, the Sibthorps and their distinguished successors is an inspiration always to be recalled, and the many rare old trees are fascinating. Seclusion for study and protection of the collections is here ensured by the enclosing high wall, and the ancient sculptured entrances are very impressive. The garden is open to visitors for some hours nearly every day. Dr. Druce showed us some of the ancient herbarium specimens collected in the United States by Mark Catesby and others, and we spent some time in naming the many undetermined ones. The mosses of the herbarium of Dillenius were of especial interest to Mrs. Britton; these are ample in quantity and perfectly preserved. Dr. Druce had spent some months in Trinidad a few years ago and there collected a large number of specimens, which had remained undetermined; I was able to name most of them, at his request. Professor Vines, who has recently retired from the Sherardian professorship, escorted us through portions of the University gardens and grounds, and we are also indebted

to him and to Mrs. Vines for charming hospitality; we talked about the history, progress and needs of botanical science.

A delightful visit was made to Cambridge as guests of Mr. John C. Willis and Mrs. Willis, and the University Botanical Garden there was studied with pleasure and profit under valued guidance by our hosts, by Mr. F. G. Preston, superintendent of the Garden, and by Miss Saunders of the School of Botany. This garden is the largest and most highly developed of all strictly University Gardens, containing a wealth of species, both hardy and under glass, many of them seen by us for the first time. I studied the noteworthy collection of Cacti with much interest and arranged for an exchange of some cuttings with Mr. Preston. Miss Saunders told us about some of her experimental work in plant breeding. We discussed with Mr. Willis many of the problems of geographical distribution and mutation of plants, to which he has given close attention in recent years from data drawn largely through his experience as director of the botanical garden at Peradeniya, Ceylon, and of the botanical garden at Rio de Janeiro, and also consulted with him relative to further field work in South America; he is at present the botanical advisor in Europe of the Brazilian government.

Circumstances provided opportunity for visits to the New Forest, which we reached by motor-car from Southampton, while awaiting our sailing for home, and we now understand the fascination this great reservation has for all nature-lovers. We are grateful to officers of the International Mercantile Marine Company for their care of the scientific specimens taken with us for study on the "Philadelphia" and brought back on the "New York," and for other favors.

The most important consideration concerning botanical science which has deeply impressed itself upon me after this interesting trip, is one which I already had some cognizance of. It is that the botanical institutions of the United States and their older, sister institutions of England are undermanned scientifically. The knowledge of plants has during the past two decades increased by leaps and bounds through exploration, experimentation and discovery; the collections of the institutions have

correspondingly increased, but the personnel of their staffs has not. For the organization of this vastly increased knowledge, the arrangement and classification of the immensely valuable collections and the presentation of results of investigation to the public, it is essential that provision for additional experts be made.

Respectfully submitted,

N. L. BRITTON,
Director-in-Chief.

NOTES, NEWS AND COMMENT

Dr. Marshall A. Howe lectured on "Dahlias and their Culture" before the South Side Garden Club at West Islip, Long Island, on September 10, and on September 29 he acted as one of the judges at the annual dahlia show of the Short Hills Garden Club at Short Hills, New Jersey.

Members of the Nature Committee of the Good Citizenship League of Flushing, Long Island, spent October 18 at the Garden, especially to study autumn coloration. They were accompanied on their tour through the grounds by members of the Garden staff.

The Garden has recently received as a gift from Mr. Lee G. Day a collection of approximately 400 orchid plants, representing some 30 species. These were shipped directly from Brazil and reached the Garden in good condition, despite considerable delay in delivery. The collection was chosen largely for its decorative flowers and promises to be a valuable addition to the present display in conservatory range 2.

Dr. N. L. Britton and Dr. C. F. Millspaugh, of the Field Columbian Museum, published June 26 *The Bahama Flora*, an octavo volume of viii + 695 pages, describing or listing with

appropriate keys the known flora of the group of islands. The work is based on the long-continued explorations of the islands by the authors, assisted by members of the Garden staff and others. The chapters on the lower cryptogams were contributed by Mrs. N. L. Britton (mosses), Dr. Alexander W. Evans (liverworts), Dr. L. W. Riddle (lichens), Dr. M. A. Howe and the late Dr. F. S. Collins (algae), Mr. C. S. Boyer (diatoms), and Dr. F. J. Seaver and Dr. W. A. Murrill (fungi).

Meteorology for September. The total precipitation for the month was 5.01 inches. The maximum temperatures recorded for each week were 80° on the 3d, 88° on the 12th, 83° on the 18th, 89° on the 24th. The minimum temperatures were 50° on the 3d, 54° on the 9th, 19° on the 20th, 49° on the 23d.

The American Rose Society held a regular meeting at the Garden September 29. The members first assembled at the Mansion at 10:30 A.M. and at 10:45 visited the Rose Garden. After a luncheon in the tea-room of the Mansion, there was a business meeting in the adjoining lecture hall, followed by an interesting program. At 3 o'clock the visiting guests were taken on a tour of inspection through portions of the grounds and buildings, including the hemlock grove, the new iris garden, the herbaceous garden, conservatory range 1, the flower gardens in the vicinity, and the dahlia collection.

Professor William B. Brierly, of the new Institute of Plant Pathology of Rothamsted, England, visited the Garden on October 8. He came over in July as a representative of the English Government to take part in the fruit-disease survey through the Shenandoah Valley and northward. Later, he made an extensive tour through the United States east of the Rockies, visiting the experiment stations and universities and getting acquainted with American botanists and American methods of research in phytopathology. On October 9, he sailed for England, taking with him the good wishes of everyone who met him.

Work is actively in progress on the construction of a stone entrance to the Horticultural Grounds from Southern Boulevard and a wall and fence along the east side of the same street. This is being accomplished through the bequest of the late Mrs. Mary J. Kingsland.

The Cherry Garden Shelter House, the gift of Dr. N. L. Britton and Mrs. Britton in honor of the late Judge Charles P. Daly and Mrs. Daly, was opened October 28. A number of invited guests were present and Dr. R. A. Harper, chairman of the Scientific Directors, made an appropriate address as the memorial tablet was unveiled. A photograph of the shelter house will appear in a later issue of the JOURNAL.

ACCESSIONS

LIBRARY ACCESSIONS FROM JUNE 1 TO OCT. 31.

- BADGER, MRS. C. M. *Wild flowers drawn and colored from nature*. New York, 1859. (Given by Mrs. Fannie Griscom Parsons.)
- BONPLAND, AIMÉ JACQUES ALEXANDRE, & HUMBOLDT, FRIEDRICH WILHELM HEINRICH ALEXANDRE VON. *Nova genera et species plantarum quas in peregrinatione Orbis novi collegerunt . . . in ordinem digessit C. S. Kunth*. 7 vols. Lutetiae Parisiorum, 1815-1825.
- BRITTON, NATHANIEL LORD, & MILLSPAUGH, CHARLES FREDERICK. *The Bahama flora*. New York, 1920. (Given by Dr. N. L. Britton.)
- BRITTON, NATHANIEL LORD, & ROSE, JOSEPH NELSON. *The Cactaceae*. Vol. 2. Washington, 1920. (Given by Dr. N. L. Britton.)
- BURDON, KATHERINE JANET. *A handbook of St. Kitts-Nevis*. London, 1920. (Given by Dr. N. L. Britton.)
- DUGGAR, BENJAMIN MINGE. *Fungous diseases of plants*. Boston, 1909.
- ENGLER, ADOLPH. *Beiträge zur Entwicklungsgeschichte der Hochgebirgsflora erläutert an der Verbreitung der Saxifragen*. Berlin, 1916. (Given by Dr. N. L. Britton.)
- FAWCETT, WILLIAM, & RENDLE, ALFRED BARTON. *Flora of Jamaica*. Vol. 4. London, 1920. (Given by Dr. N. L. Britton.)
- HEDRICK, ULYSSES PRENTISS. *Manual of American grape-growing*. New York, 1919.
- JACQUIN, NICOLAUS JOSEF VON. *Fragmenta botanica*. Viennae Austriae, 1809.
- JACQUIN, NICOLAUS JOSEF VON. *Stapeliarum in hortis vindobensibus cultarum*. Vindobonae, 1806.
- PANTOCSEK, JÓSEF. *Beiträge zur Kenntnis der fossilen Bacillarien Ungarns*. Vols. 1-3 Ed. 2. Berlin, 1903-05.

- SANDE, BAKHUYZEN, HENDRIK LEO VAN DE. *Analyse der fototropische stammings-verschijnseln*. Groningen, 1920. (Given by Dr. N. L. Britton.)
- SAUNDERS, CHARLES FRANCIS. *Useful wild plants of the United States and Canada*. New York, 1920. (Given by Robert M. McBride & Co.)
- URBAN, IGNATZ. *Symbolae antillanae*. Vol. 8, pt. 1. Berlin, 1920.
- VRIES, HUGO DE. *Opera e periodicis collata*. Vol. 3, 4. Utrecht, 1918-20.
- ZENKER, JONATHAN KARL, SCHLECHTENTHAL, DIEDRICH FRANZ LEONHARD VON, & LANGETHAL, CHRISTIAN EDUARD. *Flora von Thüringen*. 12 vols. Jena. 1836-55.

MUSEUMS AND HERBARIUM

- 2 specimens of flowering plants from Virginia. (Collected by Dr. W. A. Murrill.)
- 6 specimens of mosses from Colorado and Alaska. (By exchange with the United States National Museum.)
- 1 specimen of moss from Washington. (By exchange with Professor T. C. Frye.)
- 30 specimens of mosses from Florida. (By exchange with Mr. Severin Rapp.)
- 1 specimen of moss from Texas. (By exchange with Professor S. W. Stanfield.)
- 100 specimens of mosses from Cuba. (By exchange with Brother Leon.)
- 27 specimens of mosses and hepatics from Cuba. (By exchange with Brother Hioram.)
- 1 specimen of *Haplophilus gilvus* from Illinois. (By exchange with Dr. P. S. O'Gara.)
- 9 specimens of woody and fleshy fungi from southern Florida. (Collected by Dr. and Mrs. N. L. Britton.)
- 2 specimens of *Ganoderma nevadense* from California. (By exchange with Dr. A. S. Rhoads.)
- 1 specimen of *Merulius* from Georgia. (By exchange with Mr. B. B. Higgins.)
- 6 specimens of fungi from Colorado. (By exchange with Professor Ellsworth Bethel.)
- 2 specimens of cup fungi from California. (By exchange with Professor Ellsworth Bethel.)
- 38 specimens of Ascomycetes from various localities. (By exchange with Dr. W. H. Long.)
- 1 specimen of *Tylostoma mammosum* from Utah. (By exchange with Professor A. O. Garrett.)
- 8 specimens "Fungi Wisconsinenses Exsiccati." (Distributed by Dr. J. J. Davis.)
- 432 specimens "West American Fungi." (Distributed by Dr. David Griffiths.)
- 23 specimens of fungi from Washington. (By exchange with Mr. Geo. L. Zundel.)
- 1 specimen of *Xanthoporia Andersonii* from Maryland. (By exchange with Dr. Geo. C. Hedgcock.)
- 100 specimens "North American Uredinales" fascicle 22. (Distributed by Mr. Elam Bartholomew.)
- 94 miscellaneous specimens of flowering plants from Europe. (By exchange with the Royal Garden, Kew, England.)
- 75 specimens of lichens from Switzerland. (Distributed by Dr. C. Mereschkowsky.)

157 specimens of orchids from South America. (By exchange with the Royal Garden, Kew, England.)

22 specimens of flowering plants from the mountains of North Carolina. (Given by Mr. Arthur Huger.)

69 specimens of lichens from western North America. (Given by Dr. Albert C. Herre.)

1 specimen of box-huckleberry from Pennsylvania. (Given by Mr. H. A. Ward.)

1 specimen of *Gemmingia chinensis* from Texas. (Given by Mr. D. A. Saunders.)

52 specimens of flowering plants from western North America. (By exchange with the United States National Museum.)

1 specimen of *Centaurea maculosa* from Virginia. (Given by Dr. W. A. Murrill.)

1 specimen of *Scleropoa rigida* from Oregon. (Given by Dr. J. C. Nelson.)

500 specimens of plants from New England. (Given by Mr. Charles F. Batchelder.)

2 specimens of *Radicula austriaca* from Wisconsin. (By exchange with Professor A. L. Stone.)

6 specimens of flowering plants from Florida. (Given by Mr. Severin Rapp.)

1 specimen of *Vaccinium crassifolium* from North Carolina. (Given by Mrs. Walter B. Devereux, Jr.)

1130 specimens of flowering plants from British Guiana. (Collected by Professor A. S. Hitchcock.)

JOURNAL
OF
The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director



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PUBLISHED FOR THE GARDEN

AT 45 NORTH QUEEN STREET, LANCASTER, PA.

THE NEW ERA PRINTING COMPANY

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ARTHUR J. CORBETT, *Superintendent of Buildings and Grounds*
KENNETH R. BOYNTON, *Supervisor of Gardening Instruction*

JOURNAL
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ACT OF INCORPORATION

AS AMENDED BY CHARTER 103 OF THE LAWS OF 1894,
CHAPTER 717 OF THE LAWS OF 1896 AND CHAPTER 473
OF THE LAWS OF 1914

CHAPTER 285

AN ACT to provide for the establishment of a
botanic garden and museum and arboretum, in Bronx
Park, in the City of New York, and to incorporate
The New York Botanical Garden for carrying on the
same.

Approved by the Governor April 28, 1891. Passed,
three-fifths being present.

The People of the State of New York, represented in **The**
Senate and Assembly, do enact as follows: **Corporation**

SECTION 1. Seth Low, Charles P. Daly, John S.
Newberry, Charles A. Dana, Addison Brown, Parke
Godwin, Henry C. Potter, Charles Butler, Hugh J.
Grant, Edward Cooper, Cornelius Vanderbilt, Nathan-
iel L. Britton, Morris K. Jesup, J. Pierpont Morgan,
Andrew Carnegie, Thomas F. Gilroy, Eugene Kelly,
Jr., Richard T. Auchmuty, D. O. Mills, Charles F.
Chandler, Louis Fitzgerald, Theodore W. Myers,

Purposes of the Garden

William C. Schermerhorn, Oswald Ottendorfer, Albert Gallup, Timothy F. Allen, Henry R. Hoyt, William G. Choate, William H. Draper, John S. Kennedy, Jesse Seligman, William L. Brown, David Lydig, William E. Dodge, James A. Scrymser, Samuel Sloan, William H. Robertson, Stephen P. Nash, Richard W. Gilder, Thomas Hogg, Nelson Smith, Samuel W. Fairchild, Robert Maclay, William H. S. Wood, George M. Oclut, Charles F. Cox, James R. Pitcher, Percy R. Pyne and such persons as are now, or may hereafter be associated with them, and their successors, are hereby constituted and created a body corporate by the name of The New York Botanical Garden, to be located in the City of New York, for the purpose of establishing and maintaining a botanical garden and museum and arboretum therein, for the collection and culture of plants, flowers, shrubs and trees, the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects, for affording instruction in the same, for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation and instruction of the people.

Powers of the Corporation

SEC. 2. Said corporation shall have all such corporate powers, and may take and hold by gift, grant or devise all such real and personal property as may be necessary and proper for carrying out the purposes aforesaid, and for the endowment of the same, or any branch thereof, by adequate funds therefor.

SEC. 3. Said corporation may adopt a constitution and by-laws; make rules and regulations for the transaction of its business, the admission, suspension and expulsion of the associate members of said corporation, and for the number, election, terms, and duties of its officers, subject to the provisions of this act; and may from time to time alter or modify its

constitution, by-laws, rules and regulations, and shall be subject to the provisions of Title 3, of Chapter 18, of the first part of the Revised Statutes.

SEC. 4. The affairs of the said corporation shall be managed and controlled by a Board of Managers as follows: The president of Columbia College, the professors of botany, of geology and of chemistry therein, the president of the Torrey Botanical Club, and the President of the Board of Education of the City of New York, and their successors in office, shall be ex-officio members of said corporation and of the Board of Managers, and be known as the Scientific Directors; they shall have the management and control of the scientific and educational departments of said corporation and the appointment of the Director-in-Chief of said institution, who shall appoint his first assistant and the chief gardener, and be responsible for the general scientific conduct of the institution. All other business and affairs of the corporation, including its financial management, shall be under the control of the whole Board of Managers, which shall consist of the Scientific Directors, as herein provided, and of the Mayor of the City of New York, the President of the Board of Commissioners of the Department of Public Parks, and at least nine other managers to be elected by the members of the corporation. The first election shall be by ballot, and held on a written notice of ten days, addressed by mail to each of the above-named incorporators, stating the time and place of election, and signed by at least five incorporators. Three of the managers so elected shall hold office for one year, three for two years, and three for three years. The term of office of the managers elected after the first election, save those elected to fill vacancies in unexpired terms, shall be three years; and three managers and such others as may be needed to fill vacancies in unexpired terms

**Board of
Managers**

**Scientific
Directors**

**Director-in-
Chief**

**Representa-
tives of the
City**

**Elective
Managers**

Officers	<p>shall be elected annually, pursuant to the by-laws of the corporation. The number of elective managers may be increased by vote of the corporation, whose terms and election shall be as above provided; and members may from time to time be added to the Scientific Directors by a majority vote of the Scientific Directors, approved by a majority vote of the whole Board of Managers. The Board of Managers shall elect from their number a President, Secretary and Treasurer, none of whom or of the Board of Managers, save the Secretary and Treasurer, shall receive any compensation for his services. Nine incorporators shall constitute a quorum at any meeting of the incorporators, but a less number may adjourn.</p>
Quorum of the Corporation	
Original Endowment	<p>SEC. 5. Whenever the said corporation shall have raised, or secured by subscription, a sum sufficient in the judgment of the Board of Commissioners of the Department of Public Parks in the City of New York, for successfully establishing and prosecuting the objects aforesaid, not less, however, than two hundred and fifty thousand dollars within seven years from the passage of this act, the said Board of Commissioners is hereby authorized and directed to set apart and appropriate upon such conditions as to the said Board may seem expedient, a portion of the Bronx Park, or of such other of the public parks in the City of New York north of the Harlem River in charge of the said Department of Parks as may be mutually agreed upon between the said Board of Commissioners and the Board of Managers of said corporation in lieu of Bronx Park, not exceeding two hundred and fifty acres, for establishing and maintaining therein by the said corporation a botanical garden and museum, including an herbarium and arboretum, and for the general purposes stated in the first section of this act. And the said Board of Commissioners is thereupon hereby authorized and directed to construct and equip</p>
Grounds in Bronx Park 250 Acres	

within the said grounds so allotted, according to plans approved by them and by said Board of Managers, a suitable fire proof building for such botanical museum and herbarium, with lecture rooms and laboratories for instruction, together with other suitable buildings for the care and culture of tender or other plants, indigenous or exotic, at an aggregate cost not exceeding the bonds hereinafter authorized to be issued by the City of New York; the use of said buildings upon completion to be transferred to said corporation for the purposes stated in this act. And for the purpose of providing means therefor, it shall be the duty of the Comptroller of the City of New York, upon being thereto requested by said Commissioners, and upon being authorized thereto by the Board of Estimate and Apportionment, to issue and sell at not less than their par value bonds or stock of the Mayor, Aldermen and Commonalty of the City of New York, in the manner now provided by law, payable from taxation, aggregating the sum of five hundred thousand dollars, bearing interest at a rate not exceeding three and one-half per centum per annum, and to be redeemed within a period of time not longer than thirty years from the date of their issue.

**Construction
of Buildings**

SEC. 5-a. The Board of Estimate and Apportionment of the City of New York may, in its discretion, set apart and appropriate, upon such conditions as it may deem expedient, for the extension and development of the work and objects of the said New York Botanical Garden, the whole or any part of that portion of Bronx Park in the city of New York situated between the southern boundary of the land in Bronx park heretofore appropriated for the use of the said New York Botanical Garden by the Board of Commissioners of the Department of Public Parks, and the northern side of Pelham Avenue; the land so to be appropriated to be described more particularly in

**Power of the
City to
appropriate
additional
land**

the Board of Estimate and Apportionment hereby authorized. (Chapter 473, Laws of 1914.)

**Restrictions
in use of the
grounds**

SEC. 6. The grounds set apart, as above provided, shall be used for no other purposes than authorized by this act, and no intoxicating liquors shall be sold or allowed thereon. For police purposes and for the maintenance of proper roads and walks, the said grounds shall remain subject at all times to the control of the said Board of Commissioners of the Department of Parks; but otherwise, after the suitable laying out of the same and the construction of proper roads and walks therein by the Department of Parks, the said grounds and buildings shall be under the management and control of the said corporation. The said grounds

**Grounds open
and free daily**

shall be open and free to the public daily, including Sundays, subject to such restrictions only as to hours as the proper care, culture and preservation of the said garden may require; and its educational and scientific privileges shall be open to all alike, male and female, upon such necessary regulations, terms and conditions as shall be prescribed by the managers of those departments.

SEC. 7. This act shall take effect immediately.

CONSTITUTION

ARTICLE I

The provisions of the act of incorporation approved April 28, 1891, as amended by Chapter 103 of the laws of 1894, approved March 7, 1894, are, in pursuance of Section 3 of said act, adopted and form a part of this Constitution.

ARTICLE II

**Election of
Officers**

A President, two Vice-Presidents, a Secretary and a Treasurer shall be elected yearly by the Board of Managers from their number in the manner provided

by section 4 of the act of incorporation; and the persons so elected shall respectively be the President, Vice-Presidents, Secretary and Treasurer of the Board of Managers and of the corporation. There shall also be elected an Assistant Treasurer, who need not be a member of the Board of Managers. Vacancies in either of said offices may be filled by the Board of Managers until the next annual election.

ARTICLE III

The Scientific Directors and the Board of Managers may respectively appoint such other persons and such committees to aid in the performance of the duties and business of their respective departments as they shall deem best.

**Appointment
of committees**

ARTICLE IV

The Scientific Directors and the Board of Managers are each authorized to adopt such by-laws, rules and regulations in their respective departments as shall be approved by them respectively, and also to change or amend the same from time to time; and the same when so adopted by them, shall be deemed the by-laws, rules and regulations of the corporation.

**Adoption of
By-Laws,
Rules and
Regulations**

ARTICLE V

Associate members may be admitted, suspended or expelled in the manner provided for by the rules adopted by the Board of Managers.

**Associate
Members**

ARTICLE VI

Benefactors, Patrons, Fellows-for-Life, Fellowship Members, Sustaining Members, Life Members and Annual Members may be created by the Board of Managers and admitted upon the payment of such sums as shall be approved and established by the Board.

**Patrons, Life
Members,
Annual
Members**

ARTICLE VII

Amendments to Constitution Amendments to this Constitution not incompatible with the act of incorporation may be made by a vote of four-fifths of the members present at any regular meeting of the incorporators, or at any special meeting called for the purpose by the Secretary, upon the direction of the President, on ten days' prior notice by mail of such meeting and of the proposed amendments.

BY-LAWS

I

Annual Meeting of the Corporation

The annual meeting for the election of managers and of additional members of the corporation shall be held in the City of New York on the second Monday in January. A notice of such meeting shall be mailed by the Secretary to each member of the corporation at least ten days previous. The number of elective managers may be increased, and vacancies in unexpired terms may be filled, by vote of the corporation at any annual meeting, and also at any special meeting called upon the recommendation of the Board of Managers, upon like notice, and with notice of the proposed increase.

II

President and Vice-president

At all meetings of the corporation and of the Board of Managers, the President shall preside; or, in his absence, one of the Vice-Presidents. The President, or either Vice-President, is authorized to approve bills of the Garden against city maintenance appropriations.

III

Meeting of the Board of Managers

The managers shall hold an annual meeting on the second Monday in January, following the annual meeting of the corporation. Other regular meetings of the managers shall be held on the third Thursdays of April, June and November. Special meetings may be held by direction of the President, or, in his absence, by the direction of either Vice-President.

IV

Five managers shall constitute a quorum at any meeting of the Board of Managers, providing that not more than two are Scientific Directors.

**Quorum of
the Board of
Managers**

V

Committees of the Board of Managers, to be appointed by the Board at each annual meeting, shall include:

Committees

- An Executive Committee,
- A Finance Committee,
- A Membership Committee,
- A Committee on Endowment.

Special committees may be appointed at any meeting, and may be composed of managers, of members of the corporation, or of both.

VI

The Executive Committee shall consider all matters referred to it at meetings of the Board of Managers or of the Corporation and report at subsequent meetings, and shall annually nominate managers, officers and additional members of the corporation. It shall consist of seven members, including the President, Treasurer and Secretary. The Committee shall annually elect a chairman.

**Executive
Committee**

VII

The Finance Committee shall advise the Treasurer concerning investments and reinvestments of permanent funds, and shall have charge of such real estate as may become the property of the Corporation. It shall consist of three members, including the Treasurer.

**Finance
Committee**

VIII

The Membership Committee shall consist of three members and shall issue invitations for Annual Members, Sustaining Members, Fellowship Members, Fellows for Life, Patrons and Benefactors.

**Membership
Committee**

IX

**Endowment
Committee**

The object of the Committee on Endowment is to increase permanent funds; it shall consist of the President, Treasurer, Secretary and two other members of the Board of Managers.

X

Treasurer

The Treasurer shall collect, receive and disburse the funds of the Corporation as directed by the Board of Managers. He shall invest and reinvest all permanent funds as advised by the Finance Committee. He shall report to the managers at all stated meetings.

Xa

**Assistant
Treasurer**

The Assistant Treasurer shall perform all duties of the Treasurer during the latter's absence or disability.

XI

Secretary

The Secretary shall give notice of all meetings of the corporation, of the Board of Managers and of the Executive Committee, and shall take and preserve the minutes thereof; he shall have the custody of the seal, and shall perform such other duties as may be directed by the corporation, the Board of Managers, or the Executive Committee.

XII

**Quorum of
Scientific
Directors**

A majority of the Scientific Directors shall constitute a quorum at any meeting.

XIII

**Officers of
Scientific
Directors**

The Scientific Directors shall elect a Chairman and Secretary, who shall hold office until their successors are elected, and perform the duties which usually pertain to these offices.

XIV

Regular meetings of the Scientific Directors shall be held on the second Saturdays of April, June, October and December, and special meetings may be held pursuant to call by the Chairman.

**Meetings of
Scientific
Directors**

XV

The Women's Auxilliary shall consist of at least twelve members. Additional members may be elected at any meeting of the managers after nomination by the Auxiliary. This committee shall aid the managers in conducting receptions and other public functions, in obtaining contributing members, and in such other objects as may be referred to it by the Board of Managers. Honorary members of the Women's Auxiliary chosen from women who have rendered noteworthy service to the Garden, may also be appointed by the managers after nomination by the Auxiliary.

**Women's
Auxiliary**

XVI

The election of managers and of additional members of the corporation shall be by ballot. All other votes at meetings may be taken *viva voce*, unless a ballot be demanded by some member, whereupon the vote shall be taken by ballot.

**Elections to
be by ballot**

XVII

Amendments to the By-Laws may be made at any meeting by a vote of a majority of the entire Board of Managers and by the unanimous vote of a quorum.

**Amendments
to By-Laws**

REGULATIONS FOR THE OFFICE OF DIRECTOR-IN-CHIEF

1. The Director-in-Chief is the Executive Officer of the Garden, and is responsible to the Board of Managers, and to the Scientific Directors, for the general management and control of all its departments.

He shall promptly and efficiently carry out all their regulations and directions, and be responsible for the proper maintenance and good order of the buildings and grounds.

2. He may from time to time make recommendations for the development and management of the Garden in all its departments, including the laying out of the grounds, the construction of buildings and the conduct of the museums, the herbarium or any of the departments of the Garden, accompanying the same by his estimate of the probable cost therefor.

3. He shall recommend the employment of such persons as shall be needed for the various departments of the Garden and have power to remove all employees, except those upon a yearly salary. All such salaried employees he shall have power to suspend, and, on approval of the appropriate committee or board, to discharge.

4. He shall make all necessary purchases of tools, implements and supplies for the Garden as authorized, and shall be responsible for the proper inventory, care, and use of the same.

5. He shall examine, correct and certify all bills incurred under his management, and shall keep, in books provided for that purpose, an accurate account of his expenditure of all appropriations made for Garden purposes, which books, together with proper vouchers, shall at all times be open to inspection by members of the Board.

6. He shall keep a copy of his official correspondence.

7. He shall use diligent efforts to build up the Garden Herbarium, the Library and the Museum, and the collections of living plants and trees, by correspondence, by exchanges of duplicates not needed, and by purchases, so far as means therefor are placed at his disposal.

8. He shall report to the Board of Managers, the Scientific Directors, or special committees, in such manner and at such times as they may direct.

9. He shall make no expenditures and incur no liabilities, except under appropriations made by the Board.

10. He shall devote his whole time and energies to the promotion of the Garden interests, and shall not engage in any outside work except with the approval of the Board or the Executive Committee.

PROVISIONS FOR CONTRIBUTING MEMBERSHIP

1. *Benefactors*.—The contribution of \$25,000.00 or more to the funds of the Garden by gift or by bequest entitles the contributor to be a benefactor of the Garden.

2. *Patrons*.—The contribution of \$5,000.00 or more to the funds of the Garden by gift or by bequest shall entitle the contributor to be a patron of the Garden.

3. *Fellows for Life*.—The contribution of \$1,000.00 or more to the funds of the Garden at any one time shall entitle the contributor to be a fellow for life of the Garden.

4. *Fellowship Members*.—Fellowship members pay \$100.00 or more annually and become fellows for life when their payments aggregate \$1,000.00.

5. *Sustaining Members*.—Sustaining members pay from \$25.00 to \$100.00 annually and become fellows for life when their payments aggregate \$1,000.00.

6. *Annual Members*.—Annual members pay an annual fee of \$10.00. All members are entitled to the following privileges:

1. Tickets to all lectures given under the auspices of the Board of Managers.

2. Invitations to all exhibitions given under the auspices of the Board of Managers.

3. A copy of all handbooks published by the Garden.

4. A copy of all annual reports and Bulletins.

5. A copy of the monthly Journal.

7. *Life Members*.—Annual Members may become Life Members by the payment of a fee of \$250.00.

Form of Bequest.—I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of

PROVISIONS OF THE CHARTER OF THE CITY OF NEW YORK FOR MAINTENANCE

§1613. It shall be the duty of the commissioner for the boroughs of Manhattan and Richmond to maintain the meteorological and astronomical observatory, the Museum of Natural History, the Metropolitan Museum of Art in Central Park, the Aquarium in Battery place, and such other buildings as now are or may hereafter be erected in such parks or in any other park, square or public place under his jurisdiction by authority of the board of aldermen. It shall be the duty of the commissioner for the boroughs of Brooklyn and Queens to maintain the Brooklyn Institute of Arts and Sciences, and such other buildings as now are or may hereafter be erected in any park, square or public place under his jurisdiction by authority of the board of aldermen. It shall be the duty of the commissioner for the borough of The Bronx to maintain the New York Botanical Garden and the buildings appurtenant thereto, and such other institutions or buildings as may be established or erected in any park, square or public place in his jurisdiction by authority of the board of aldermen. It shall be the duty of the several commissioners to provide the necessary instruments, furniture and equipments for the several buildings and institutions within their respective jurisdictions, and, with the authority of the board of aldermen, to develop and improve the same, and to erect additional buildings; but the maintenance of all such buildings and institutions shall be subject to the provisions of the acts incorporating said institutions, or either of them, and the acts amendatory thereof, and to the powers of said corporations thereunder, and of the boards by such acts created or provided for; and shall also be subject to and in conformity with such contracts and agreements as have heretofore been made with such institutions respectively,

and are in force and effect when this act takes effect, or as may be hereafter made by the authority of the board of aldermen, and no moneys shall be expended for such purposes unless an appropriation therefor has been made by the board of estimate and apportionment and the board of aldermen. Out of the moneys annually appropriated for the maintenance of parks each commissioner may apply such sum as shall be fixed by the board of estimate and apportionment for the keeping, preservation and exhibition of the collections placed or contained in buildings or institutions now situated or hereafter erected in the parks, squares or public places under the jurisdiction of such commissioner.

§625. The commissioner for the borough of The Bronx is hereby authorized and directed to carry out the existing contract made by and between the department of parks of the corporation heretofore known as the mayor, aldermen and commonalty of the city of New York and the board of managers of the corporation known as the New York Botanical Garden pursuant to the provisions of chapter two hundred and eighty-five of the laws of eighteen hundred and ninety-one, entitled "An act to provide for the establishment of a botanic garden and museum and arboretum in Bronx park in The City of New York and to incorporate the New York Botanical Garden for carrying on the same," as amended by chapter one hundred and three of the laws of eighteen hundred and ninety-four, which contract provides for the alloting and setting apart for the uses of said garden of two hundred and fifty acres of land or less in the northern part of Bronx Park as shown upon a certain map thereof numbered five hundred and sixty-eight, and signed by Messrs. Vaux and Parsons, and filed with the former department of public parks of the corporation known as the mayor, aldermen and commonalty of the city of New York.

NOTES, NEWS AND COMMENT

On the afternoon of November 20, Miss Slater brought a group of Nature-Study teachers to the Garden to get them acquainted with the collections of living plants and other facilities for teaching their subject. At the close of the excursion, they attended a lecture in Conservatory Range 2 by Dr. Gleason on "Tropical Beverage Plants."

Meteorology for October: The total precipitation for the month was 1.38 inches. The maximum temperatures recorded for each week were as follows: 80° on the 4th, 86° on the 14th, 84° on the 21st, and 73° on the 26th and 27th. The minimum temperatures were 43° on the 6th and the 13th, 39° on the 24th, and 34° on the 30th.

The following visiting botanists enrolled in the library during the autumn: Professor Alfred C. Hottes, Columbus, Ohio, Professor Etienne Foex, Paris, France, Dr. Norma E. Pfeiffer, Grand Forks, N. D., Mr. G. W. Martin and Mr. Elba E. Watson, New Brunswick, N. J., Mr. A. C. Fraser, Ithaca, N. Y., Dr. Emmeline Moore, Albany, N. Y., Mr. William W. Diehl and Mr. W. W. Eggleston, Washington, D. C., Professor Frederic E. Clements, Tucson, Ariz., Prof. H. M. Hall, Berkeley, Calif. and Dr. Roland M. Harper, College Point, L. I.

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